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Medium Term Framework

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Seed Minikits of Pulses - Program
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The April edition of the journal "Agricultural Situation in India" brings for its readers the major farm news, price indices, data on procurement of food grains and much more. Two research articles, one on "Agricultural Sector: Evolving a Medium Term Framework" and second on "Factors Affecting Growth of Agriculture in Punjab" are part of the journal. An Agro-Economic Research study on "Seed Minikits of Pulses - Program Relevance and Distribution Efficiency in Karnataka" conducted by the Agricultural Development and Rural Transformation Centre (ADRTC), Institute for Social and Economic Change, ISEC, Bengaluru under the Agro-Economic Research scheme of the Directorate of Economics and Statistics has also been included.

The major farm sector news for the month of April inter-alia covers; National Conference on Agriculture - Kharif Campaign-2022; Kisan Bhagidari, Prathmikta Hamari campaign; National Conference of Cluster Based Business Organisations held; comprehensive training program of the National Institute of Agricultural Extension Management; Indian banana & baby corn get market access in Canada; online portals on export/import of agricultural commodities and pesticides registration launched; among other news.

In the month of April, 2022, annual inflation stood at 15.08 percent over April, 2021. Annual food inflation increased by 8.88 percent during April, 2022 over April, 2021 whereas on month-on-month basis, it increased by 3.35 percent in April, 2022 over March, 2022, provisionally. The cumulative pre-monsoon season rainfall in the country during the period 1st March, 2022 to 27th April, 2022 has been 31 percent lower than the long period average (LPA). Current live storage in 140 major water reservoirs in the country was 65.32 BCM as against 51.18 BCM of normal storage based on the average storage of last 10 years.

The article on "Agricultural Sector: Evolving a Medium Term Framework" evaluates the current status of the agriculture sector with focus on major crops of wheat and rice. It also examines the food grain situation and corresponding buffer stock situation. The article also proposes a medium term framework in line with the prevailing mechanisms like GST Council, Monetary Policy Committee,

etc. which may help in allocation of resources and better implementation of the issues related to finance, governance, etc. The study envisages that such a commission with representation from various diversified field like agricultural scientists, economists, bureaucrats, farmer unions, etc. will facilitate in compiling rich database across states. This in turn will facilitate objective diagnosis and analysis of real, financial and economic parameters.

The article on "Factors Affecting Growth of Agriculture in Punjab" examines the growth pattern of agriculture in the state of Punjab. Over the years, area under wheat and paddy has grown significantly, but at the expense of crops like maize, cotton and sugarcane. No doubt, mechanization, use of fertilizer and power consumption has remarkably increased over the years and also helped in increasing the productivity. Productivity may be further enhanced by adjusting the input use and by introducing new research techniques. The study infers that four factors; namely net sown area, pesticides, fertilizers and food grain production have significant contribution towards agricultural growth in the state. Crop diversification may be promoted to sustain crops like cotton and maize. Allied activities like fish and milk production may be strengthened as these activities support the farmers and agriculture sector.

The Agro-Economic Research study on "Seed Minikits of Pulses - Program Relevance and Distribution Efficiency in Karnataka" tries to assess the relevance of seed minikit programme and how this scheme has affected the production, productivity and the returns received by the farmers. With a focus on replacing old seeds with HYV seeds which are pest and disease resistant, the seed minikit programme is being implemented in the state and also across the country. As these kits are provided free of cost, their use has resulted in lowering the input costs. Also these kits are found to increase the production and productivity. The quantity of seeds being provided, however, have been found to be insufficient. It has been observed that increasing the quantity, ensuring timely availability of the kits and imparting proper training to the farmers will help them in making appropriate use of seed minikits.

Promodita Sathish

Farm Sector News

Meetings and Events

National Conference on Agriculture - Kharif Campaign - 2022

Hon'ble Union Agriculture Minister, Shri Narendra Singh Tomar inaugurated National Conference on Agriculture for Kharif Campaign 2022-23 on 19th April, 2022 at NASC Complex, New Delhi. The objective of this conference was to review and assess the crop performance during the preceding crop seasons and fix crop-wise targets for Kharif season in consultation with State Governments, ensure supply of critical inputs and facilitate adoption of innovative technologies with a view to enhance production and productivity of the crops.

The Minister expressed satisfaction that as per the 2nd Advance Estimates (2021-22), total food grains production in the country is estimated at 3160 lakh tonnes which will be an all time record. The pulses and oilseeds production will be 269.5 lakh tonnes and 371.5 lakh tonnes, respectively. As per the third advanced estimates, horticulture production during 2020-21 is 3310.5 lakh tonnes which is the highest ever for Indian horticulture. The Minister stated that the Centre and states would work together to ensure pesticides and seeds availability to reduce input costs for farmers. He urged that there should be a strategy to replace urea with Nano-urea. He declared that the Government would continue to lay emphasis on natural and organic farming. On exports, the Minister said that while agriculture exports have increased, attention should be paid on quality products so that they can compete in international markets.

The priority of government is agro-ecological based crop planning for diversion of land from excess commodities like rice and wheat to deficit commodities like oilseeds and pulses and high value export earning crops. Government is giving high priority to crop diversification with focus on self sufficiency in oilseeds and pulses and promotion of oil palm. Consultations with

all stakeholders like major states, researchers, industries and policy makers have been held to finalize a national policy framework for crop diversification programme in the country. All the states should work towards crop diversification for making agriculture sustainable, profitable and self sufficient in deficit commodities.

The Conference set national targets for total food grain production at 3280 lakh tonnes for the year 2022-23 compared to expected production of 3160 lakh tonnes during current year. Target for production of pulses and oilseeds have been fixed at 295.5 lakh tonnes and 413.4 lakh tonnes, respectively, in 2022-23. Nutri-cereals production has to be increased from 115.3 lakh tonnes in 2021-22 to 205.0 lakh tonnes in 2022-23. The strategy would be to increase area through inter-cropping and crop diversification and productivity enhancement through introduction of HYVs and adoption of suitable agronomic practices in low yielding regions.

Shri Manoj Ahuja, Secretary (Agriculture and Farmers Welfare), said that the country is maintaining an increasing trend in food grain production since 2015-16. Total food grain production has increased by 25% in last 6 years from 251.54 to 316.01 million tonnes. Oilseeds have followed a similar trend and have shown a growth of 42% from 25.25 million tonnes in 2015-16 to 37.15 million tonnes in 2021-22. India's exports of agricultural products have grown by 19.92% during 2021-22 to touch \$50.21 billion (Rs. 376575 crore). Commodities like wheat, other cereals, rice (other than basmati), soya meal, raw cotton, fresh vegetable and processed vegetables, etc. have registered most positive growths.

He said, "We have to accelerate the production and productivity of agriculture and horticulture sectors for ensuring food and nutritional security in the rural areas. The Government has adopted several developmental programmes, schemes, reforms and policies that focus on higher incomes for the farmers. Action Plan for 3 years Seed Rolling Plan (2021-22 to 2023-24) for all oilseeds

with allocation of Rs. 381.95 crore will produce a total of 14.7 lakh quintals of quality seed of new HYVs in the next 3 years.”

Kisan Bhagidari, Prathmikta Hamari campaign

Ministry of Agriculture and Farmers Welfare organized the ‘Kisan Bhagidari, Prathmikta Hamari’ campaign from 25th to 30th April, 2022 under ‘Azadi Ka Amrit Mahotsav’ in association with other Ministries for creating awareness and publicity among farmers across the country about the schemes and programmes of the Ministry of Agriculture & Farmers Welfare and other allied Ministries; namely Ministry of Food Processing Industries, Ministry of Animal Husbandry, Ministry of Rural Development and Ministry of Cooperation.

While launching the campaign on 26th April, 2022 to inaugurate the activities of MoA&FW, Hon’ble Union Agriculture Minister, Shri Narendra Singh Tomar interacted with farmers across the country who were present in Krishi Vigyan Kendras (KVKs) in towns and cities in various states across India. The Minister told the farmers that they should be willing to experiment and change with the times, should be willing to use new variety of seeds, test the quality of their soil, join Farmer Producer Organisations (FPOs) and utilize technology including drones. Farmers should also be willing to come under the protective shield of the Pradhan Mantri Fasal Bima Yojana (PMFBY). On Natural Farming, the Minister stated that it is being promoted and ICAR is including it in the syllabus.

Krishi Mela at each KVK was also organised in association with ATMA. Awareness programmes on organic farming, natural farming, startups, APMCs, e-NAM, FPOs were also organised. Seminars and workshops on horticulture activities were also conducted.

On 27th April, 2022, Shri Tomar participated in a special ‘Fasal Bima Pathshala’ drive under Pradhan Mantri Fasal Bima Yojana (PMFBY). The special programme was attended by more than 1 crore farmers from various locations across the country. Addressing the farmers across the country on

Fasal Bima Pathshala, the Minister said that farmers have benefitted from the Pradhan Mantri Fasal Bima Yojana (PMFBY) and a large number of farmers are connected with this scheme. He informed that under the Fasal Bima Yojana, from Kharif 2016 till Kharif 2021, every year about 5.5 crore farmers applied for crop insurance and till now around Rs. 21000 crore premium has been collected and farmers have got more than 1.15 lakh crore payment as insurance claim. He emphasized that the Pradhan Mantri Fasal Bima Yojana can play a very important role in providing financial security to the farmers of the country against the crop losses arising due to various natural calamities.

Emphasizing that Central Government is committed to increasing the income of farmers, the Minister outlined various schemes of the Government for the benefit of farmers attending the Pathshala and urged them to register under PM-Kisan and take advantage of the Kisan Credit Card (KCC) which will free them from the clutches of money lenders. The Minister also urged the farmers to join Farmer Producer Organizations (FPOs) and join the e-NAM for marketing of their produce. The Minister also explained how infrastructure developed at the farm gate with the help of Agriculture Infrastructure Fund (AIF) can benefit small farmers. He motivated farmers to take up integrated farming and include fisheries and dairying to augment their income.

Shri Tomar said that farmers who have benefitted from government schemes should become “Ambassador” farmers and help other farmers to gain and thereby strengthen Indian agriculture.

Followed by the central event, the Agriculture Ministers of various States interacted with the farmers of their respective States and addressed the farmers on importance of crop insurance and Fasal Bima Pathshala. The special programme, which will be extended for a week by PMFBY implementing insurance companies, will focus on educating farmers on importance of PMFBY/ Restructured Weather Based Crop Insurance Scheme (RWBCIS) in participation with State Agriculture Departments, banks, CSC and Krishi Vigyan Kendra.

As part of the campaign, the Ministry of Agriculture & Farmers Welfare organized demonstration on farm machinery through their FMTTIs (Farm Machinery Training and Testing Institute) at different locations across the country. FMTTIs also imparted training to women farmers simultaneously. Along with physical field visits, online webinar was also organised to provide interface between innovators and industries.

Ministry of Agriculture & Farmers Welfare through National Bee Board (NBB) conducted a National Conclave on “Wild and Forest Honey” with collaboration of Tribal Cooperative Marketing Development Federation of India Limited (TRIFED). Sweet Revolution has enabled the tribal beekeepers to fetch a price 1.5 to 2 times more than earlier one. 100 FPOs of Beekeepers/ Honey Producers have been identified by NBB and out of these, 14 FPOs have been allotted to TRIFED which are promoting production of wild honey through its “Van Dhan Programme” being implemented in 27 States and 307 districts.

Webinar and awareness programme on improved production technology of high value and exotic vegetable crops under protected cultivation was also organised at CIH, Nagaland & State Horticulture Department of NER. Training on microrrhizome based disease free planting material production in ginger and turmeric was also provided by Directorate of Arecanut and Spices Development at Kerala Agricultural University, Thrissur. Various online activities were held on beekeeping by National Bee Board (NBB). Krishi Mela on cashew was organised by the Directorate of Cashew & Cocoa Development. A webinar on ODOP products, Horticulture Cluster Development was also organised by the National Horticulture Board (NHB) at state level offices of National Horticulture Board and at State Horticulture Missions.

Simultaneously, all the allied Ministries and Departments organised various programmes as a part of ‘Kisan Bhagidari Prathamikta Hamari’ which included a nationwide campaign through ICAR Institutes on bio-fortification, nutri-cereals, millets cultivation and on crop diversification.

Watershed Management Division of Department of Land Resources organized a webinar on the subject “Integrated Watershed Development, its contribution towards sustainable utilization of natural resources, enhancing livelihood and incomes of farmers”.

National Conference of Cluster Based Business Organisations held

Hon’ble Agriculture Minister, Shri Narendra Singh Tomar on the occasion of National Conference of Cluster Based Business Organisations (CBBOs) held on 21st April, 2022 emphasised that the role of CBBOs should be to strengthen the Farmer Producer Organisations (FPOs) so that farmers seek them out and more and more farmers are part of FPOs. Shri Tomar said that earlier around 7,000 FPOs were made but they could not last and a new scheme of FPOs was launched with an outlay of Rs. 6865 crore. At the conference, Union Agriculture Minister also launched the logo for 10,000 FPOs scheme.

Indian agriculture is dominated by small and marginal farmers with average land holdings size of less than 1.1 ha. These small and marginal farmers constituting more than 86% of the total land holdings are facing tremendous challenges both in production and post-production scenarios like access to production technology, quality inputs at reasonable prices, seed production, custom hiring, value addition, processing, credit, investments and most importantly markets. Hence, collectivization of such producers through formation of FPOs is very important to address such challenges and enhance their incomes. Realizing the need to form and promote FPOs across the country, Government formulated a dedicated Central Sector Scheme “Formation & Promotion of 10,000 Farmer Producer Organizations (FPOs)” which was launched on 29th February, 2020 at Chitrakoot (UP). The scheme is based on produce cluster approach to enhance production, productivity, market access, promote diversification, value addition, processing and export and also to create agri based employment opportunities with the aim to economically empower farmers.

The FPOs to be eligible under the scheme for financial benefit and technical handholding are

required to be registered either under Companies Act, 2013 or States' Co-operative Societies Act with minimum number of 300 farmers in plain areas and 100 farmers in hilly and NER. Under the scheme, there is provision for financial support of maximum Rs. 18.00 lakh per FPO for 3 years as management cost to make them sustainable and economically viable. To strengthen the financial base of FPOs and entail them to avail collateral free loan, there is also provision for matching equity grant of maximum Rs. 2000/- per member with ceiling of Rs. 15 lakh/FPO and credit guarantee facility up to bankable project loan of Rs. 2.00 crore.

Under the scheme, CBBOs have been provisioned as the professional agency with a critical role to play as they are to engage themselves all along the value chain; starting right from mobilization of farmers, baseline survey, identification of produce clusters, formation of groups, registration and capacity building to preparation of business plan, execution thereof with assurance to provide the market to the FPOs. They are also to establish cardinal link with implementing agencies and FPOs.

Progress:

1. More than 5.87 lakh farmers have been mobilized under the scheme.
2. About 3 lakh farmers have been registered as shareholders of the FPOs.
3. Equity contribution by farmer members amounts to Rs. 36.82 crore.
4. Total equity base of the FPOs, including the equity grant released, amounts to Rs. 50 crore.
5. 201 women focused FPOs have been registered.
6. 481 FPOs registered in tribal districts.
7. FPOs have started business transactions:
 - 84 FPOs of 14 CBBOs of SFAC have made transactions worth Rs. 928.28 lakh.

- 12 FPOs of 3 CBBOs of NAFED have made transactions worth Rs. 48.35 lakh.

Considering the significance of CBBOs and to ensure that they discharge their duties effectively and also to understand their field level implementation issues, representatives of 265 CBBOs empanelled by 13 implementing agencies were invited in the conference. All the 13 implementing agencies, senior officers from State Governments dealing with FPOs were also invited. More than 4,900 produce clusters have been allocated and 2331 FPOs registered.

Comprehensive Training Program of the National Institute of Agricultural Extension Management

Hon'ble Union Minister for Agriculture and Farmers Welfare, Shri Narendra Singh Tomar on 05th April, 2022 inaugurated the online training program for master trainers on natural farming, organized by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad. Speaking on the occasion, Shri Tomar said that MANAGE has been entrusted with the task of organizing 750 awareness programs for 30 thousand village heads in the country from April to August as part of the Azadi Ka Amrit Mahotsav.

The Union Minister said that keeping in mind the importance of natural farming, a national conference on natural farming was organized in Gujarat on 16th December, 2021 under the leadership of the Prime Minister, in which lakhs of farmers participated. Natural farming is a promising means of reducing the dependence of farmers on external inputs, reducing the cost of cultivation and increasing the income of the farmers. The Government is promoting the Indian Natural Farming System (BPKP) as a sub-scheme of Paramparagat Krishi Vikas Yojana (PKVY) to promote traditional indigenous practices. In the coming days, trained master trainers will organize 750 awareness programs for 30,000 village heads across the country and help in taking forward the initiative of natural farming in their respective states. 4.09 lakh hectare area is covered under natural farming. An announcement has also been made in the budget for the year 2022-23 to promote natural farming. A committee has been formed to

include courses on natural farming in universities in the states.

General Agricultural Sector News

High Yielding Varieties/Hybrids of field crops

Indian Council of Agricultural Research (ICAR) led National Agricultural Research System (NARS) has developed 1956 high yielding varieties/hybrids of 80 field crops since 2014 which include 173 less water requiring varieties/hybrids of cereals (94), oilseeds (14), pulses (25), fiber crops (8), forages (12) and sugarcane (20).

Total of 56 less water requiring varieties/hybrids of field crops have been developed during 2018-19 to 2020-21, comprising 31 of cereals (10 of rice, 7 of wheat, 3 of maize, 2 of sorghum and 9 of millets); 6 of oilseeds (2 of soybean, 2 of groundnut, 1 of sesame, 1 of Indian mustard); 10 of pulses (1 of urad bean, 4 of pigeon pea, 1 of horse gram, 2 of chickpea, 1 of lentil and 1 of faba bean); 2 of forages (1 each of fescue grass and setaria grass); 2 of cotton and 5 of sugarcane.

During the last 3 years, 6975.32 quintals (2018-19: 2446.7 q, 2019-20: 2204.45 q and 2020-21: 2324.17 q) breeder seed of less water requiring varieties were produced and supplied to various public and private seed production agencies for downstream multiplication as foundation and certified seed by ICAR. A total of 74,43,879 q of certified/quality seeds of high yielding varieties/hybrids (including stress tolerant) were made available during the years 2019-20 to 2020-21.

High-tech services in agriculture

Government has taken following steps to provide digital and hi-tech services which will open up opportunities for private entrepreneurs:

- i. The Department has constituted a high level Task Force, which is in the process of finalizing a report on India Digital Ecosystem of Agriculture (IDEA) which would lay down the architecture of Digital AgriStack with unique ID for farmers and standards for interoperability between various data

streams in the Agristack. This would open up possibilities for developing services and solutions by private entrepreneurs.

- ii. Provisions are being made under Agriculture Infrastructure Fund (AIF) to fund private agritech players.
- iii. Government of India has made an announcement in the Union Budget 2022 regarding the setting up of a fund routed through NABARD under a co-investment model to finance startups in the agritech space.
- iv. Government is providing financial assistance through Sub Mission on Agricultural Mechanization (SMAM) to Farm Machinery Training and Testing Institutes (FMTTIs), Indian Council for Agricultural Research (ICAR) Institutes, Krishi Vigyan Kendra (KVK), Farmer Producer Organizations (FPOs) and State Agricultural Universities (SAUs) for drone demonstrations and for establishment/upgrading the Custom Hiring Centres (CHCs)/Hi-Tech Hub for providing agricultural services by using drone technology. Drone service providers can also avail benefits of Agriculture Infrastructure Fund.
- v. Rashtriya Krishi Vikas Yojna (RKVY) is a central sponsored scheme in which the states can implement projects under RKVY in PPP mode by approving such projects by the State Level Sanctioning Committee (SLSC) of the state.
- vi. A component called "Innovation and Agri-Entrepreneurship Development" has been launched under Rashtriya Krishi Vikas Yojana (RKVY-RAFTAAR) in 2018-19 with the objective of promoting innovation and agri-entrepreneurship by providing financial support and nurturing the incubation ecosystem. Under this programme, startups are encouraged to use innovative technologies to resolve challenges faced in agriculture and allied sectors. A total of 799 startups have been selected in various areas of agriculture and allied sectors under this programme for providing financial support through

Knowledge Partners and Agri-Business Incubators appointed by the Government for implementation of this programme.

- vii. The Indian Council of Agriculture Research (ICAR) has been supporting agri-based startups under the project called National Agriculture Innovation Fund (NAIF) initiated in year 2016-2017. It has two components *viz.*; I. Innovation Fund; II. Incubation Fund and National Coordinating Unit (NCU):

Component I: 10 Zonal Technology Management Units and 89 Institute Technology Management Units (ITMUs) established in 99 ICAR institutes provide a single-window mechanism to manage innovations, showcase intellectual assets, and pursue matters related to intellectual property (IP) management and transfer/commercialization of technologies in these institutes.

Component II: Agri-Business Incubator Centres (ABICs) are set up to speed up the delivery of the new technologies to stakeholders. The ABICs are the nodal point to provide the desired link for Agriculture Research & Development (R&D) Institutions for incubation/commercialization of the validated technologies. So far, 50 Agri-Business Incubation Centers have been established and are operational in the ICAR network under the NAIF scheme.

Production of oilseeds

The production of oilseeds in the country has increased substantially during last three years from 31.52 million tonnes in 2018-19 to 37.15 million tonnes in 2021-22 (2nd Advance Estimates, Directorate of Economics and Statistics). Details of production of oilseeds during last three years and current year are as under:

Year	Production (Million Tonnes)
2018-19	31.52
2019-20	33.22
2020-21	35.95
2021-22*	37.15

* 2nd Advance Estimates, DES.

The Government has been implementing a Centrally Sponsored Scheme, National Food Security Mission-Oilseeds & Oil Palm (NFSM-OS&OP) from 2018-19 onwards to increase the production and productivity of oilseeds in the country. Now the Government has launched a separate Mission for oil palm namely National Mission on Edible Oils (Oil Palm) - NMEO (OP) in 2021-22.

Both NFSM-Oilseeds and NMEO (OP) are being implemented in the country with the objective of augmenting the availability of edible oils by increasing the production and productivity of oilseeds & oil palm and reducing the import burden.

Conclave on Natural Farming

Natural farming is a traditional indigenous livestock based agricultural practice which gives freedom to farmers from all kinds of externally purchased inputs like chemical fertilizer or pesticides as well as organic fertilizers like vermicompost, organic manure, biofertiliser, bio-pesticides. Thus, it reduces the cost of farming and thereby provides benefit, mostly to small and marginal farmers. Transition of natural farming requires large scale access to natural farming techniques as farmers shift from traditional fertilizer and pesticide based system to a system where no inorganic chemical is added to the farm.

Government is implementing Bhartiya Prakritik Krishi Padhati (BPKP) introduced during 2020-21 as a sub scheme of Paramparagat Krishi Vikas Yojana (PKVY) for the promotion of agro-ecological farming system which have many variants and is based on sound ecological principles and traditional indigenous practices including natural farming. The scheme is generic in nature and gives freedom to farmers to adopt indigenous practices with emphasis on exclusion of all synthetic chemical inputs and also promotes on-farm biomass recycling with major stress on biomass mulching, use of cow dung-urine formulations and other plant-based preparations. Training through capacity building is integral part of the scheme. Under BPKP, financial assistance of Rs. 12200/ha for 3 years is provided for cluster

formation, training capacity building, organising conferences and continuous handholding by trained personnel, certification and residue analysis. An area of 4.09 lakh ha has been covered under natural farming and a total fund of Rs. 4980.99 lakh has been released to 8 states namely Andhra Pradesh, Chhattisgarh, Kerala, Himachal Pradesh, Jharkhand, Odisha, Madhya Pradesh and Tamil Nadu. Apart from this, an additional area of 5.68 lakh ha has been approved for 3 states namely Andhra Pradesh, Rajasthan and Uttar Pradesh.

Technological products by Krishi Vigyan Kendra (KVKs)

The Government has made provision for opening of Krishi Vigyan Kendra (KVK) in each of the rural districts keeping in view the rationale that new agricultural technologies and best practices are assessed and demonstrated at farmers' fields.

The quality technological products produced by KVKs during the last three years are 5.48 lakh quintals seeds, 1150.53 lakh planting materials, 2.74 lakh quintals bio-products; and 680.79 lakh livestock strains and fingerlings.

The activities of KVKs include assessment and demonstration of agricultural technologies; training of farmers and extension personnel; providing farm advisories to farmers; and production of quality seeds, planting materials and other technological inputs, besides creating awareness on improved agricultural technologies among the farmers. These activities lead to the adoption of new technologies by the farmers that solve their field problems, reduce the cost of cultivation and increase production and returns to them.

Indian banana & baby corn get market access in Canada

The negotiations between National Plant Protection Organisations of India and Canada on market access for Indian banana and baby corn has resulted in Canadian market access for these commodities. In a meeting held between Shri Manoj Ahuja, Secretary (DA&FW) and H.E. Cameron MacKay, Canadian High Commissioner on 07th

April, 2022, Canada informed that export of fresh baby corn from India to Canada may begin from April, 2022 after updation of directive D-95-28: Plant Protection Import and Domestic Movement Requirements for Corn and the Automated Import Reference System (AIRS). Further, based on the technical information provided for fresh banana by India, Canada has approved banana for entry into Canada with immediate effect.

This decision of the Government of Canada would immensely benefit the Indian farmers growing these crops and would also enhance India's export earnings.

Ananthapur Banana Cluster and Horticulture Cluster Development Programme reviewed

Dr. Abhilaksh Likhi, IAS, Additional Secretary, Ministry of Agriculture & Farmers Welfare, Government of India visited the Karnapudiki village of Narpala Mandal in Ananthapur district of Andhra Pradesh to review the Horticulture Cluster Development Programme (HCDP) of National Horticulture Board. Ananthapur for banana has been selected as a pilot cluster under HCDP. During the visit, Dr. Likhi interacted with the stakeholders of the banana value chain from the cluster. While interacting with the banana growers he highlighted that the programme addresses the challenges of entire value chain, including pre-production, production, post-harvest management, logistics, marketing and branding.

The HCDP is designed to leverage geographical specialisation and promote integrated and market-led development of horticulture clusters. He explained to banana growers the importance of Good Agricultural Practices resulting in getting quality produce which would eventually translate into higher remuneration. He urged block-level horticulture officers to take a workshop with farmers on Cluster Development Programme and make them understand the programme's aspects and objectives.

Ministry of Agriculture and Farmers Welfare has identified 55 horticulture clusters, of which 12 have been selected for the pilot launch of the

programme. The clusters of the pilot phase include Shopian (J&K) and Kinnaur (H.P.) for apple, Lucknow (U.P.), Kutch (Gujarat) and Mahbubnagar (Telangana) for mango, Anantpur (A.P.) and Theni (T.N.) for banana, Nasik (Maharashtra) for grapes, Siphahijala (Tripura) for pineapple, Solapur (Maharashtra) and Chitradurga (Karnataka) for pomegranate and West Jaintia Hills (Meghalaya) for turmeric.

Talking about the reach and impact of the programme, Dr. Likhi said, "Banana Cluster in Ananthapur will benefit about 14,000 banana farmers and related stakeholders of the value chain and will handle approximately 7.5 lakh MT of banana. With this programme, we aim to improve exports of the targeted crops by 20-25% and create cluster-specific brands to enhance the competitiveness of cluster crops".

Online portals on export/import of agricultural commodities and pesticides registration

Hon'ble Union Minister for Agriculture and Farmers Welfare, Shri Narendra Singh Tomar on 18th April, 2022 launched two portals, one for the Computerized Registration of Pesticide (CROP) and the other for Plant Quarantine Management System (PQMS). Speaking on the occasion, the Minister said that these two portals would help in taking forward digital agriculture and ease of doing business. Shri Tomar expressed happiness

stating that agriculture exports have taken a great leap forward.

Department of Agriculture and Farmers Welfare (DA&FW), Ministry of Agriculture and Farmers Welfare through the Directorate of Plant Protection, Quarantine & Storage (DPPQS), Faridabad has been catering to Indian exporters and importers of agriculture commodities and Indian pesticide industry through its two portals; namely Computerized Registration of Pesticide (CROP) and Plant Quarantine Information System (PQIS). Realising the need for quicker disposal of applications related to export/import of agricultural commodities and pesticides registration, a more coordinated integration with external systems and stakeholders, and to bring in greater transparency in the existing online system, DA&FW has launched two redeveloped online portals.

The PQMS portal will provide a transparent system with no physical touch points for the applicants and ensure convenience to the users, through online system including e-payments and uploading of documents, online accreditation and renewal of treatment agencies/facilities and downloading of certificates. Similarly, the re-developed CROP portal will immensely help in ease of doing business and provide greater and timely crop protection solution to farmers of the country.

General Survey of Agriculture

Trend in Food Prices

The rate of inflation, based on monthly WPI, stood at 15.08% (Provisional) for the month of April, 2022 (over April, 2021) as compared to 10.74% during the corresponding period of last year.

Based on Wholesale Price Index (WPI) (2011-12 = 100), WPI of vegetables, fruits and cereals increased by 23.24 percent, 10.89 percent and 7.80 percent, respectively, whereas for pulses it decreased by 0.34 percent in April, 2022 over corresponding period of last year.

Among cereals, WPI based rate of inflation for wheat and paddy increased by 10.70 percent and 1.48 percent, respectively, in April, 2022 over April, 2021.

The WPI for cereals, fruits and vegetables increased by 1.37 percent, 19.59 percent and 4.45 percent, respectively, whereas for pulses it decreased by 0.23 percent in April, 2022 over March, 2022.

Among cereals, WPI for wheat and paddy increased by 0.81 percent and 0.73 percent, respectively, in April, 2022 over March, 2022.

WPI food index (Weight 24.38%)

The Food Index consisting of 'Food Articles' from Primary Articles group and 'Food Product' from Manufactured Products group have increased from 167.3 in March, 2022 to 172.9 in April, 2022. The rate of inflation based on WPI Food Index increased from 8.71% in March, 2022 to 8.88% in April, 2022.

Rainfall and Reservoir Situation, Water Storage in Major Reservoirs

Cumulative Pre-Monsoon Season (March-May), 2022 rainfall for the country as a whole during the period 1st March, 2022 to 27th April, 2022 has been 31% lower than the Long Period Average (LPA). Rainfall in the four broad geographical divisions

of the country during the above period has been higher than LPA by 25% in South Peninsula & by 8% in East & North East India but lower than LPA by 87% in North-West India and by 70% in Central India.

Out of 36 meteorological sub-divisions, 10 meteorological sub-divisions received large excess/excess rainfall, 02 meteorological sub-divisions received normal rainfall, 23 meteorological sub-divisions received deficient/large deficient rainfall and 01 meteorological sub-division received no rainfall.

Current live storage in 140 reservoirs (as on 28th April, 2022) monitored by Central Water Commission having Total Live Capacity of 175.96 BCM was 65.32 BCM as against 60.22 BCM on 28.04.2022 (last year) and 51.18 BCM of normal storage (average storage of last 10 years). Current year's storage is 108% of last year's storage and 128% of the normal storage.

National Commodity & Derivatives Exchange (NCDEX)

The National Commodity & Derivatives Exchange (NCDEX), established in 2003, is an Indian commodities exchange that mainly trades agricultural commodities. Barley, wheat, and soybeans are some of the leading agricultural commodities traded on the NCDEX.

On 20th December, 2021, the Securities and Exchange Board of India (SEBI) suspended futures and options trading in seven agriculture commodities: non-basmati rice, wheat, green gramme, soyabean and its derivatives, rapeseed-mustard complex, crude palm oil, and chana for a period of one year in a bid to rein in prices. Despite this, the National Commodity and Derivatives Exchange reported a 47 percent increase in average daily turnover at ₹1,857 crore in the financial year ending March, 2022 against ₹1,261 crore logged in the previous fiscal. This was largely driven by sharp spike in agriculture commodity prices last year due to supply chain disruptions. The ADTV

on the commodity bourse had crossed the pre-pandemic level of ₹1,794 crore. NCDEX is also planning to launch futures trading in coffee by end of June.

Traditionally, NCDEX is known for trading in agriculture derivatives but now the

exchange is planning to diversify into non-price sensitive commodities and build volumes in new commodities other than agriculture like in polyvinyl chloride PVC.

Articles

Agricultural Sector: Evolving a Medium Term Framework

VENKAT HARIHARAN ASHA¹, BRIJESH KUMAR PATEL² AND SACHIN BANSAL³**Abstract**

Agriculture continues to be the backbone of the rural economy and is a vital pillar of the national economy. This article presents a case study of the crops sector by focussing on rice and wheat and its associated activities. The paper also brings out factors which would help in diversification in these crops and also underlines the importance of policy implications. An innovative framework manifesting in the form of an 'Agricultural Commission' that would give just representation of medium-term interests aligned with the overall vision is suggested. This would involve the participation of all key stakeholders coming together to deliberate and execute implementation of vital reforms in a holistic manner to achieve its objectives in order to improve the efficiency of resource allocated, sharing of technical know-how also to align priorities in the context of political economy and federal set-up.

Keywords: *Agricultural Commission, governance framework, policy, buffer stock, revealed comparative advantage*

1. Introduction

Hon'ble Union Agriculture Minister informed the Rajya Sabha on 05.02.2022 that, "as per the changing requirements of the country to change the cropping pattern, to make Minimum Support Price (MSP) more effective and transparent, and to encourage natural farming, the process of setting up a committee is under process." This also follows key announcements made in the Union Budget 2022, which inter-alia include promotion of chemical-free farming throughout the country, support to value addition and enhance consumption of millets, a rationalized and comprehensive scheme to increase the domestic production of oilseeds. From the foregoing, it is clear that serious interventions are envisaged with a long-term perspective and vision for the agricultural sector. The paper tries to tread forth by portraying the relative snapshot of the sector in the context of the country's economy. Further in pursuit of building a narrative within the agricultural sector, the paper delves into the dynamics of the commodities of rice and wheat, since these commodities entail the

highest attention in terms of their significant share in economic activity (production, procurement and distribution – characterizing their pan India relevance by virtue) and associated budgetary outgo. Subsequently, the growing diversification towards commodities such as pulses and oilseeds is also touched upon to indicate a shift in patterns as well as to postulate the potential of other major items of the food basket in terms of trends in domestic consumption patterns as well as possible expansion in global market share. Finally, in the backdrop of the narrative of the changing character of commodity profiles thus captured, an idea of evolution of a medium term framework to improve governance of the policy making process to guide and steer through changing dynamics in the sector by taking a holistic account of necessary parameters is put forth.

1.1 Objectives of the study

- i. To depict the importance of agricultural sector in the Gross Value Added (GVA) of the economy as well as share in budgetary outlay.

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- ii. To briefly examine the buffer stock operations of rice and wheat.
- iii. To explore the case for further diversification to other commodities and realize export potential, in view of changing demand-supply dynamics.
- iv. Postulate constitution of an 'Agricultural Commission' as a medium term framework to take into account key priorities in a holistic manner and for appropriate interventions.

2. Discussion

2.1 Macro-economic view

To begin with, the National Accounts Statistics (NAS), 2021 reveals that the Gross Value Added (GVA) at basic prices (constant 2011-12 prices)

for the Agriculture, Forestry and Fishing (AF&F) sector grew from Rs. 15 lakh crore to Rs. 19.7 lakh crore during 2011-12 to 2019-20, thereby recording a Compound Annual Growth Rate (CAGR) of about 3.4%. Further, the major segments of this sector as identified by the NAS include crops; livestock; forestry and logging; and fishing and aquaculture of which the former has exhibited the largest base and the lowest CAGR during the aforesaid period (Table 1). It is desirable that such trends in composition are monitored closely *vis-à-vis* their desirable composition and growth trajectory in the medium term since these have implications over a host of socio-economic variables (employment, wages, migration *et. al*). Further, this would also permit an evaluation of demand-supply gap in essential commodities and distributional aspects across the economic agents involved in these sub-components.

TABLE 1: MAJOR SEGMENTS OF AGRICULTURE SECTOR AND GROWTH RATE (2011-12 TO 2019-20)

Sub-component of the agricultural sector	Share in GVA at basic prices of Agriculture, Forestry and Fishing		CAGR during 2011-12 to 2019-20
	2011-12	2019-20	
Crops	65.4%	55.9%	1.4%
Livestock	21.8%	29.3%	7.4%
Forestry and logging	8.3%	8.4%	3.6%
Fishing and aquaculture	4.5%	6.4%	8.0%

Source: Computations from 2011-12 constant prices data of National Accounts Statistics (NAS), 2021

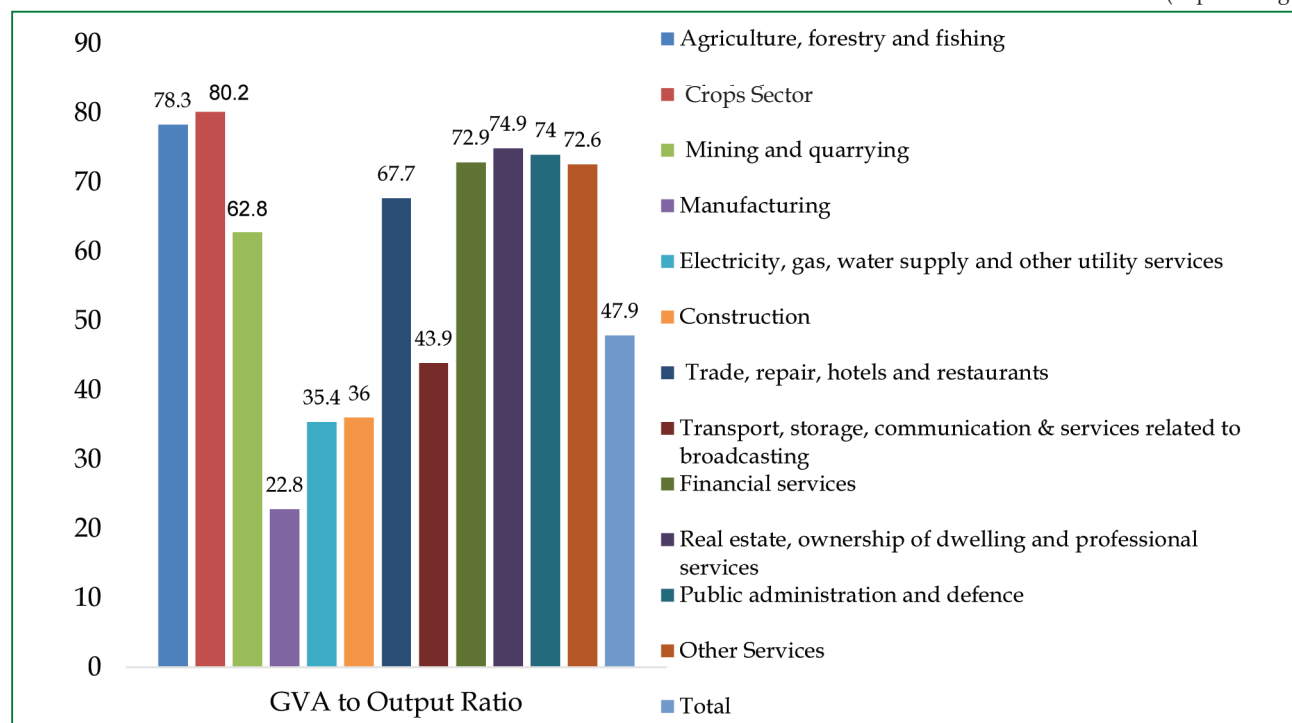
The ratio of GVA to the value of output is 80.2% for the crops sector and 78.3% for the AF&F sector, which is the highest across all sectors⁴. This high ratio is indeed exemplary as a higher output from the sector augurs well for value-added in the economy as a whole, more so with labour-intensive activity being vital. Here, it has been consciously

chosen not to delve into the examination of macro variables like wages, farmer incomes and employment, etc. since our endeavour is to do with the governance process rather than variable-specific analysis and recommendations.

⁴NAS data 2019-20 at constant (2011-12) prices

Graph 1: GVA to Output Ratios

(in percentage)



Source: National Accounts Statistics, 2021. Retrieved from <https://mospi.gov.in/>

In the crops sector, the major contributors to output of Rs. 13.71 lakh crore during 2019-20 comprise of cereals, fruits and vegetables (about 28% each) followed by oilseeds (8.5%). With respect to cereals, paddy and wheat account for 86%⁵.

2.2 Examination of food grain situation and buffer stock operations for rice and wheat

The total food grain production for crop year 2020-21 is estimated at 307.31 million tonnes which includes 231.3 million tonnes of rice and wheat taken together. A total of 99.01 million tonnes was procured by the Government at MSP during the 2020-21 Marketing Season. Purchases

at MSP are currently only restricted to purchases by the Government and are primarily driven by considerations of food security. All-in-all, in terms of aggregate production and availability of rice and wheat, India has successfully buried behind the times of famines and food shortages which were a feature of the 20th century. Hence, the time is right to orient towards equitable distribution and diversity of diets with the overall aim of wholesome nutrition.

The Food Corporation of India (FCI) oversees the buffer stock operations of rice and wheat in the country. The buffer stock norms for rice and wheat comprise of two components *viz.*; the operational stock and the strategic stock.

TABLE 2: BUFFER STOCK NORM (2017-18 TO 2021-22)

(in lakh MT)

As on	Rice			Wheat		
	Operational stock norm	Strategic stock norm	Total	Operational stock norm	Strategic stock norm	Total
1 st April	115.8	20	135.8	44.6	30	74.6

⁵ibid.

As on	Rice			Wheat		
	Operational stock norm	Strategic stock norm	Total	Operational stock norm	Strategic stock norm	Total
1 st July	115.4	20	135.4	245.8	30	275.8
1 st October	82.5	20	102.5	175.2	30	205.2
1 st January	56.1	20	76.1	108	30	138

Source: Food Corporation of India. Retrieved from <https://fci.gov.in>

An examination of the actual stock positions as on the said dates over the past 4 years (2017-18 to 2021-22) reveal that the buffer levels

have on all occasions surpassed the norms for all quarters. Moreover, the excess amounts have shown an increasing trend, year-on-year during the said period.

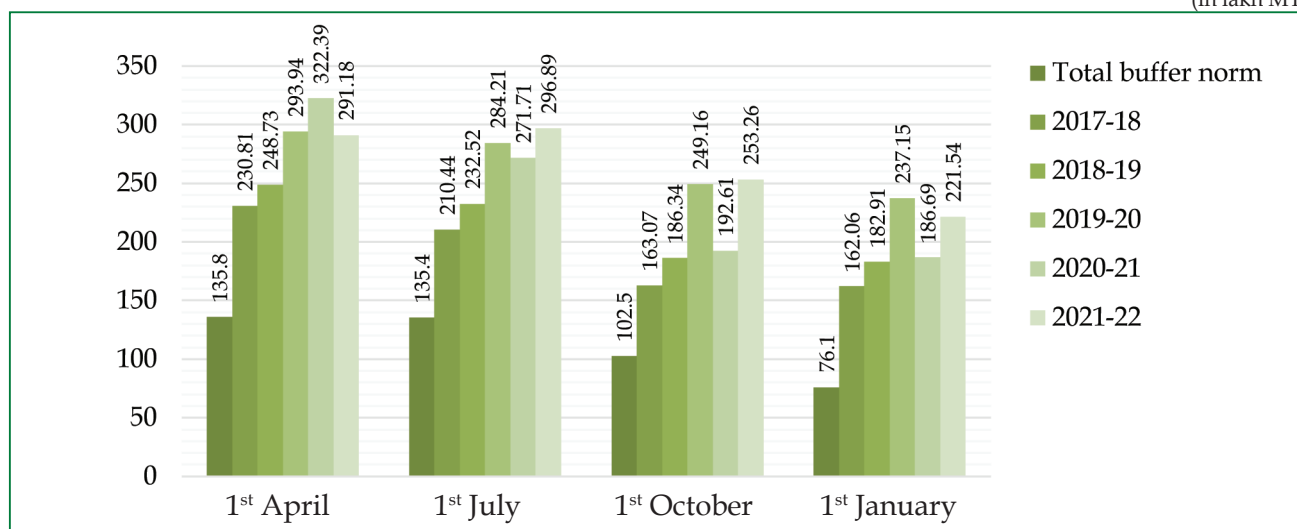
TABLE 3: INSTANCES (NO. OF QUARTERS) OF BUFFER BEING MORE THAN STIPULATED NORM (2017-18 TO 2021-22)

	Rice	Wheat
Up to 1.5 times from the norm	0	5
1.5 times up to double the norm	7	7
More than double and less than triple the norm	12	6
More than triple the norm	1	2
Total	20	20

Source: Food Corporation of India. Retrieved from <https://fci.gov.in>

Graph 2: Buffer Norms v/s Actual Buffer Levels of Rice

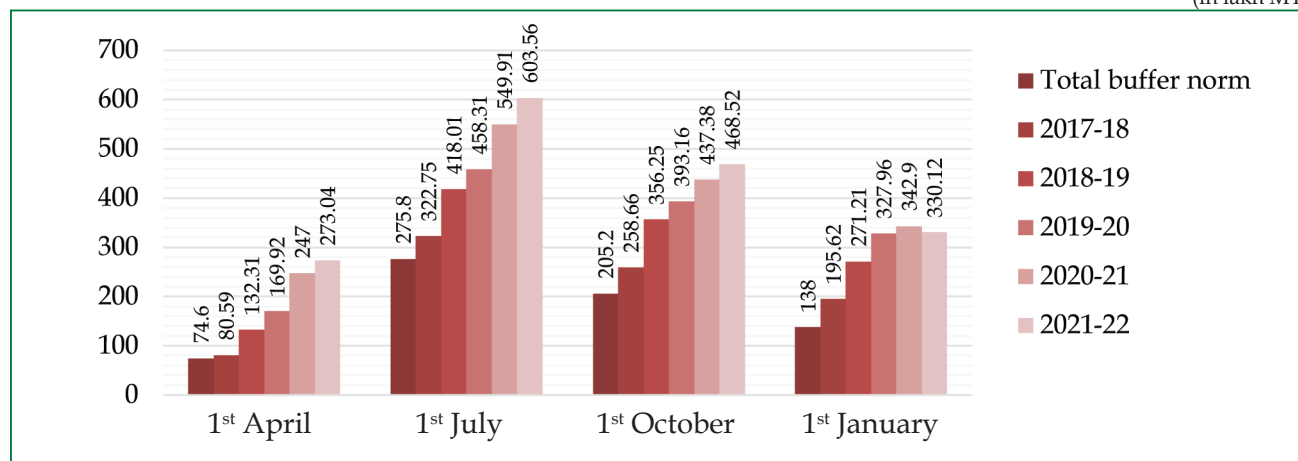
(in lakh MT)



Source: Food Corporation of India. Retrieved from <https://fci.gov.in>

Graph 3: Buffer Norms v/s Actual Buffer Levels of Wheat

(in lakh MT)



Source: Food Corporation of India. Retrieved from <https://fci.gov.in>

These excess food grains above stipulated norms not only entail additional financial burden owing to their economic costs (incidental costs and distribution costs in addition to the MSP), but also opportunity costs in terms of alternate crop production or land uses. It is to be noted that the total allocation of food grains (rice and wheat) under the Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY) from April, 2020 until November, 2022 is about 9.99 crore MT. Thus, the actual buffer levels are indeed higher than the norm (depicting an increasing trend as compared to pre-Covid times), notwithstanding this mega distribution drive which exhibited multiple positive externalities, is welfare oriented and a timely intervention to mitigate the hardships of the poor during the unprecedented ongoing COVID-19 pandemic. The bifurcation of per quintal economic cost, sales realization and subsidy component for rice and wheat buffer operation is as given below.

TABLE 4: BREAK-UP OF ECONOMIC COST FOR 2020-21
(in Rs./Qtl.)

Commodity	Economic Cost	Sales Realisation	Subsidy
Rice	3,939.26	371.13	3,568.13
Wheat	2,731.75	331.8	2,399.95

Source: Food Corporation of India. Retrieved from <https://fci.gov.in>

FCI decides buffer stocking norms for rice and wheat which is the level of stock in the Central

Pool that is sufficient to meet the operational requirement of food grains and exigencies at any point of time. This includes operational stock and strategic reserve. For January, 2021 itself, actual buffer for rice is 111 LMT excess than stocking norm, while in case of wheat it is 205 LMT in excess. If only the excess stock for this particular month is considered, subsidy for these excess stocks amounts to Rs. 39,571 crore for rice and Rs. 49,199 crore for wheat.

Further, variability on the counts of production, yield and procurement is a well-documented narrative. Uttar Pradesh and West Bengal account for the largest share in production of rice but lowest share of its procurement amongst the 11 major states. Further, in addition to these two states, share of procurement is lower than share in marketed surplus for Bihar, Madhya Pradesh and Tamil Nadu. Punjab accounts for about 1/4th of rice procurement although its share in rice production is only 1/10th in the country. Similarly, average procurement per farmer is highest in Punjab and significantly lower in Chhattisgarh, Karnataka, Kerala and West Bengal. The average yield of rice in Punjab is the highest, more than double that of Chhattisgarh, which is at the lower end of the spectrum in major producing states.

Expanding the current practice of annual announcement of the MSP to incorporate a medium term horizon (say a 5 year period) will help to

better plan and operationalize buffer operations in terms of actual levels *vis-à-vis* the norm, optimal assessment and utilization of storage space and better calibrate procurement operations to rein in excesses. Further, a gradual shift (re-allocation) in state-wise operations can also be planned in a smooth manner, if so desired.

2.3 Diversification

The above facts being widely acknowledged have urged attention and action towards crop diversification. A significant step in this direction is the increase in procurement of pulses (tur, urad, moong, masur and chana) by the Government under the Price Support Scheme and the Price Stabilization Fund. In the case of oilseeds, it is a well-known fact that India's 60% demand for edible oil is met from imports. Accordingly, the intent of increasing the area under oilseeds as also noted in the Union budget is a welcome move. Demand-side factors for diversification are also relevant and should be responded to. The 68th Round of NSS on Household Consumption of various goods and services in India (2011-12) noted a fall in per capita consumption of rice to 5.98 kg per month in 2011-12 from 6.38 kg per month in 2004-05 in rural India and a fall from 4.71 kg per month to 4.49 kg per month in urban India in the same period. A similar trend is observed in case of per capita consumption of wheat. These trends for rice and wheat have been accompanied by a rise in per capita consumption for pulses and pulse products group as a whole from 705 gm per month to 783 gm in the rural sector and from 824 gm to 901 gm in the urban sector. Hence it would be reasonable to assume their growing significance over time.

Also, monthly per capita expenditure for milk and milk products is higher in urban areas (Rs. 184) as compared to rural (Rs. 115). In case of fruits (urban- Rs. 90, rural- Rs. 41) and beverages, refreshments and processed foods (urban- Rs. 236, rural- Rs. 113) the difference is more than double between urban and rural counterparts. The rising trend in urbanization would also fuel aggregate consumption of these to a greater extent, necessitating a responsive supply chain to meet demands in an affordable manner. An increase in per-capita income in the times to come

would also entail a situation of 'weaning away from entitlements' currently bestowed under the regime of food security towards diversification and greater degree of choice and accessibility to other sources of nutritional diets.

It is also heartening to note the emphasis on non-price interventions to boost manoeuvrability of growers as far as inputs are concerned. Apart from the flagship programme of the Union Government of PM-KISAN that provides annual income support of Rs. 6,000 to farmer households, Andhra Pradesh, Telangana, Odisha, West Bengal, Chhattisgarh and Madhya Pradesh are supplementing the same with their respective schemes at State level.

Thus, diversification needs to be reviewed and guided objectively. If seen in the context of demand-side consumption requirements, it shall definitely lead to more efficient outcomes. Further, a medium-term horizon is also a suitable timeframe to examine the preference of recent interventions like income transfer (across regions and economic profiles) and behavioural trends that they ensue to guide further policy action.

2.4 Deepening and expanding export markets

Another bright spot as far as the agriculture sector is concerned is the recent performance in exports. Agricultural exports crossed the \$50 billion mark for the first time during FY 2021-22, which indeed is a tremendously significant achievement. India may emerge as a global major in the sector. Further, as per latest available data of APEDA, the total export of agri and processed food products for the period April to December in 2021 increased to Rs. 2,64,929 crore from Rs. 2,12,386 crore in the corresponding period in 2020, registering a growth rate of 24.7%. Moreover, Revealed Comparative Advantage (RCA) for vegetables, fruits, wheat, rice and oilseeds have also been computed. The RCA reflects export strength of any given product and exists when ratio of export of the concerned product to total exports of a given country exceeds the same ratio for the world as a whole⁶. The RCA index may take values from zero to infinity, with values greater than one indicating global competitiveness of the product concerned (Table 5).

⁶UNCTAD-STAT

TABLE 5: REVEALED COMPARATIVE ADVANTAGE

Commodity group/Year	2017	2018	2019	2020
Vegetables	0.754	0.742	0.694	0.738
Fruits	0.540	0.345	0.355	0.325
Wheat	0.083	0.066	0.089	0.314
Rice	17.252	15.485	14.589	18.151
Oilseeds	8.179	8.477	7.971	7.847

Source: World Integrated Trade Solution (WITS). Retrieved from <https://wits.worldbank.org/>

From the above, it is evident that there remains much potential to explore as far as vegetables, fruits and wheat is concerned, since their current RCA value is less than 1. While the export policy is one at the national level, the action is from regions across the country which exhibits their own heterogeneity. A federal mechanism monitoring exports will help to promote export competitiveness of the country by better understanding States' dynamics. Further, dedicated interventions in high-potential commodities can be framed.

2.5 Budgetary glimpse

Agriculture continues to be the backbone of the rural economy and is indeed a vital pillar to the nation. The Economic Survey, 2022 mentions that the agriculture and allied sectors alone registered annual positive growth rates of GVA at constant (2011-12) prices of 4.3%, 3.6% and 3.9% during 2019-20 (1st RE), 2020-21 (PE) and 2021-22 (1st AE), respectively, which is a strong indicator of the resilience of this sector. The budget allocation to agriculture and allied activities is estimated at Rs. 1,51,521 crore for 2022-23. In addition, fertilizer and food subsidy are estimated at Rs. 1,05,222 crore and Rs. 2,06,831 crore, respectively. These put together account for as much as about 12% of the total budgeted expenditure for 2022-23, which is a sizeable sum devoted to this life-oriented sector. In addition, state-wise budgetary flows need to be documented and evaluated along with support from the Centre to get a holistic view of outputs *vis-a-vis* resource allocated. This ought to be aligned with the larger macro vision of the sector and the economy. This would, in due course enable re-allocation towards more efficient interventions. Hence, monitoring these in a medium term sense becomes imperative.

3. Policy recommendations

With the objective of evolving a set-up to facilitate a more robust and dynamic process of policy discourse and implementation with a visionary perception, there is a need to constitute a comprehensive 'Agricultural Commission', preferably with a permanent secretariat, to work with Terms of Reference over a 5-year horizon may add further value. This is not only in terms of better efficiency in resource allocation but also in keeping pace with the changing priorities of the prevailing times which would necessitate dynamism in policy response with a futuristic lens.

This conception is largely motivated from the existing robust mechanisms *viz.*; the Finance Commission (FC), the Goods and Services Tax (GST) Council and the Monetary Policy Committee (MPC). The common thread amongst the three is their democratic construct and legal mandate with defined terms of reference. The perceived benefits of the proposed Agricultural Commission are the following:

- Firstly, the current construct of the Commission for Agricultural Costs and Prices (CACP) has a limited mandate only over those crops under the ambit of the MSP. Further, the horizon encompasses a year. A comprehensive view of the agriculture sector is needed over a medium term horizon for its holistic development. Such a commission can have broad based representation including elected representatives, bureaucrats, technical experts like agricultural scientists and economists, FPOs, farmer unions as well as industry across the Centre and States.

- Secondly, agriculture is a 'State' subject with state-specific interventions. There is a need to have a cohesive framework where interventions of the Centre and the respective state can be viewed in complementary terms, to the extent feasible. The Commission would also fulfil the capacity of a 'repository' of all interventions across Centre and state. This shall facilitate both a spatial and temporal analysis (including impact evaluations) of all such interventions which should finally aid better allocation of resources and efficacy in outcomes.
- Thirdly, most of the issues involved, be it, scientific, technological, financial or governance-related are well documented along with solutions for desired objectives. However, the implementation needs further strengthening. The Agricultural Commission shall help to spur dynamism and healthy dialogue along with facilitating peer-review and 'nudge' states to perform better. It will also help to suitably redress the so-called 'one-size-fits-all' approach in tune with state-specific requirements.
- Fourthly, for effective results, it is important that monitoring and implementation framework be largely of collaborative nature, in a federal setup. In the absence of the same, there is a tendency to 'shy away' from addressing the sensitive issues. These may entail reforms in the current public distribution system (both procurement and distribution aspects), agricultural taxation, and so on. Also, it will help sharing best practices of FPOs, help in discussion and debates on pressing issues like marginalization of farmers, migration trends as well as novel topics like extent of permitting commodity trading in secondary markets, and so on.
- Fifthly, the proposed Commission will help in compiling a rich database across states, which will facilitate objective diagnosis and analysis of real, financial & economic parameters. The real parameters may include trends and vision in terms of production, yield, international trade, input efficiency, soil health, technology and R&D as well as output and outcomes of Central and state interventions, both individually as well as taken together. The financial parameters may include wages, income, credit, cost of inputs, inflation, and most importantly, budgetary support. Analysis of these would eventually help prudence and efficiency in future allocation of scarce finances. It will also help to take stock of supply side variables like production and procurement against demand side requirements of consumption and nutrition in the backdrop of economic and environmental well-being. Also, it will help in undertaking long-term price stabilization measures in commodities like pulses, oils and vegetables and subsequently reduce the urge for knee-jerk reactions.
- Sixthly, the 'big ticket' aspects which spread beyond administrative/state boundaries like marketing reforms, infrastructure and exports which are essential to transition towards a unified market can be implemented on mission mode. This would indeed help initiatives like e-NAM and Soil Health Card better realise their potential and efficiency in operations/ outcomes. It will also facilitate smoother transition from entrenched practices like chemical based farming towards organic and zero budget farming aligning interests of all stakeholders concerned to the extent possible.
- Seventhly, increase in India's share in global trade is an indicator of growing integration in global supply chains. This is also supplemented with increasing global trade partnerships which include the recently concluded Comprehensive Economic Partnership Agreement (CEPA) with UAE and the Economic Cooperation and Trade Agreement with Australia. Similar agreements with UK, Israel, Canada and the EU are also expected soon. Other global negotiations including WTO's Agreement on Agriculture, public stockholding for food security purposes, as well as those encompassing intellectual property rights shall only increase in terms of their complex character. Such forums of international trade policy require technical

expertise and sophisticated negotiation skills to best represent the nation's interest in the context of enhancing gains from trade for the world as a whole. A commission would definitely be of great assistance in this endeavour by combining its vital strengths of institutional memory, holistic representation of diverse interests across regions in an objective manner aligned with domestic agricultural requirements. Further, it can also help to bring about a more stable and predictable regime as far as tariff policy is concerned, which is known to be more volatile than other tradables owing to its largely perishable nature.

- Eighthly, a short-term horizon is generally biased against medium and long-term interests including investment and capital formation. An institutional approach towards implementing and monitoring capital-intensive activities including building state-of-art storage capacities, private agricultural, food testing laboratories, digital transformation, farm infrastructure, food processing facilities, dedicated export infrastructure is the need of the hour to pursue these priorities in a calibrated and regionally-balanced manner.

These would in-turn, spur 'crowding in' of investments by the private sector.

- Lastly, such a setup would help in sending appropriate signal to the farmers and key agents in the agricultural sector helping them to take rational decisions which should, in turn, promote long-run stability and development.

4. Conclusion

For the development of the agricultural sector in the long run, it is essential that all the concerned stakeholders unite and evolve policy in a manner that 'enables' rather than 'supports'. While the former is liberating, the latter assumes connotation of a crutch and hence needs to be dispensed at the appropriate time. This is essential to propel independence and innovation-led growth similar to the one witnessed in IT and pharmaceutical sectors. For this, institutionalizing a robust framework of governance is vital to guide appropriate interventions at the level of the Government, incentivize key agents of the sector and propel the sector to realize its potential in the welfare of all concerned stakeholders.

Factors Affecting Growth of Agriculture in Punjab

PREKSHEEMA JANGID¹, DR. SANJAY KUMAR² AND DR. JASDEV SINGH³

Abstract

The present study was conducted to examine the growth pattern of agriculture in the state of Punjab for the period 2000-01 to 2019-20. District-wise compound annual growth rate of area, production and productivity of major crops and the variables such as fertilizers, electricity consumption, net irrigation area, cropping intensity, milk production, etc. were worked out to examine the growth pattern of agriculture. There has been significant growth in area, production and productivity of wheat and paddy in Punjab. However, the area under cotton and maize crops reported a significant decline in all the major cotton and maize growing districts of the state. With overtime development of mechanization along with expansion of irrigation facilities, there has been a significant growth in cropping intensity and fertilizers use in Punjab. The regression analysis revealed that four factors; namely net sown area, fertilizers, pesticides and food grain production have significant contribution towards agricultural growth in Punjab. It is very difficult to enhance the net sown area of the state, but the crop productivity could be improved by adjusting the input use pattern. Availability of improved seed varieties among farmers is the key factor for better productivity from crops. There is a need of uniform distribution policy for seed allocation to reach the improved seed among farmers. The government must also ensure the timely supply of essential inputs such as seed, fertilizers, pesticides, etc. to the farmers at subsidized rate. The districts with negative growth of area, production and productivity of all important crops need to be critically evaluated.

Keywords: Productivity, regression analysis, growth, production

1. Introduction

India is an agriculture dominant country with majority of working population in the country still being engaged in agriculture and its allied activities, directly or indirectly. It contributes to nation in many ways; by providing subsistence, ecological and environment services and addresses the food security of the nation. Agriculture sector accounts for 18.8 percent of India's Gross Domestic Product (GDP) at current price and employs more than 50 percent of the total workforce. Thus, agriculture sector plays a major role in the development of country's economy.

Punjab was the leading state in agriculture performance during the heydays of Green Revolution as compared to other states (Bhalla, 2007). The GSDP (Gross State Domestic Product)

from agriculture increased at 5.7 percent per annum during the period 1971-72 to 1985-86, which was more than double of 2.31 percent all-India growth in the same period. This stellar performance of Punjab in production and productivity in food grains, mainly rice and wheat, made India self-sufficient in food availability. However during the recent years, agriculture and allied sector's contribution to Gross State Domestic Product (GSDP) at constant prices has been decreasing. The share of agriculture in the GSDP was 30.81 percent in 2011-12 but declined to 29.52 percent in 2020-21 (Government of Punjab, 2021). Agriculture in Punjab is highly intensive in term of land, capital, energy, nutrient, water, agriculture input, etc. The major agriculture crops in Punjab comprises of wheat, rice, cotton and sugarcane. Amongst these crops, wheat paramounds the entire crop whereas rice, cotton, maize and sugarcane are confined to

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few regions only. Major districts of Punjab *viz.*; Ferozepur, Muktsar, Bhatinda, Moga, Sangrur, Barnala, Patiala and Fatehgarh Sahib are the largest producers of wheat and paddy.

1.1 Objectives of the study

The present study was aimed to achieve the following objectives:

1. To examine the growth of agriculture in Punjab.
2. To determine the factors affecting the growth of agriculture in Punjab.
3. To identify the constraints in agricultural growth and suggest policy implementations to overcome those constraints.

2. Data sources and methodology

The present study was undertaken on macro framework based on secondary data collected from various published sources such as Statistical Abstract of Punjab, Statistical Abstract of India and websites such as www.icrisat.org, www.indiastat.com, etc. The data are confined to three period *viz.*; period I (2000-01 to 2009-10), period II (2010-11 to 2019-20) and overall period (2000-01 to 2019-20). The data for defined periods were district-wise time series data on a number of aspects pertaining to agriculture development of Punjab *viz.*; area, production of major crops and crops groups, fertilizers, electricity consumption in agriculture, net irrigated area, cropping intensity, production of eggs, milk and fish, livestock population, etc. The growth rate of major crops and crops groups and the impact of different factors on agricultural growth of the states were critically examined by employing suitable tools such as compound annual growth rate and multiple linear regression analysis in these two periods and the period as a whole.

2.1 Estimation of compound annual growth rates (CAGR)

The compound annual growth rates (r) were estimated by fitting a linear regression trend line

to the logarithmic annual values of the variable in the relevant period. In other words, given the time series data, compound growth rates were computed by fitting an exponential function to the available data, after making it linear through logarithmic transformation. An exponential function can be written as under:

$$Y = ab^t \quad \dots (1)$$

where,

Y = Dependent variable (Area, Production, Productivity, Fertilizers, GSDP, etc.)

a = Constant term

b = Regression coefficient (the rate at which Y grows each year)

t = Time variable in years

To make the above exponential equation linear, logarithmic transformation is applied

$$\ln Y = \ln a + t \ln b \quad \dots (2)$$

Equation 2 is now a semi-log linear function where values of the parameters a and b can easily be estimated by using Ordinary Least Squares (OLS) method. The compound annual growth rates are computed by using the following formula:

$$\text{CAGR (r) \%} = (b-1) \times 100 \quad \dots (3)$$

In equation 3, b {b = antilog (log b)} is the least square regression coefficient. The significance was tested at 1, 5 and 10 percent level of significance by using student's t-test. If the calculated value of 't' was greater than table value of 't', then the growth rate was considered as significant and vice versa.

2.2 Regression analysis

In statistical modeling, regression analysis is a set of statistical processes for estimating the relationships among variables. The regression analysis also depicts the changes in the dependent variable when any of the independent variables is varied. In order to determine the effect of different

factors on the growth of agriculture in Punjab, different types of regression models such as linear, log linear and Cobb-Douglas were applied. Finally, the linear regression model was selected as an appropriate statistical tool by taking into consideration the logical signs of the regression coefficients, number of significant variables and the value of coefficient of multiple determinations (R^2). The form of regression equation is given under:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu$$

where,

Y = GSDP from agriculture sector (Rs. billion at current prices)

β_0 = Constant

β_1 to β_7 are regression coefficients

X_1 = Net sown area (000' ha)

X_2 = Electricity consumption in agriculture sector (1000 kwh)

X_3 = Fertilizer consumption (NPK, 000' tonnes)

X_4 = Pesticide use (000' tonnes)

X_5 = Cropping intensity (Percentage)

X_6 = Food grain production (000' tonnes)

X_7 = Milk production (000' tonnes)

μ = Error term

3. Results and discussion

In this section, various determinants of growth in Punjab agriculture such as area, production and

productivity of major crops and crops groups, fertilizers, electricity use in agriculture, production of fish, eggs and milk have been explained. The impact of fertilizer, electricity, cropping intensity and net irrigated area is also examined on GSDP from agriculture sector in the state.

Table 1 provides information on area, production and productivity of major crops in Punjab at two different point of time *viz.*; 2000-01 and 2019-20. It can be clearly observed from table that area under wheat and rice has increased but area under maize, cotton and sugarcane has decreased in 2019-20 as compared to 2000-01, which is mainly due to high focus on self-sufficiency in food grains and shift toward high value crops. In case of production, wheat, paddy and cotton recorded positive change in 2019-20 over 2000-01. On the other hand, production of maize and sugarcane decreased in 2019-20 over 2000-01. All the major crops showed in Table 1 showed an increase in productivity in 2019-20 as compared to 2000-01. This is mainly due to high availability of input in the state.

Table 2 shows CAGR in area, production and productivity of major crops in Punjab. It is revealed from table that growth rate in area under wheat and rice showed positive growth during overall period while maize, sugarcane and cotton showed a negative growth rate. In case of growth rate of production, paddy and wheat showed positive growth in all the three periods. On the other hand, maize showed negative growth in second period, cotton in second and overall period, and sugarcane in first period only. In case of productivity, all the crops showed positive growth rate for the overall period (2000-01 to 2019-20) while wheat and sugarcane showed negative growth rate in first period and maize in the second period.

TABLE 1: AREA, PRODUCTION AND PRODUCTIVITY OF MAJOR CROPS IN PUNJAB (2000-01 TO 2019-20)

Crops	Area (000'ha)			Production (000' metric tonnes)			Productivity (kg/ha)														
	Period 1	Period 2	Overall	Period 1	Period 2	Overall	Period 1	Period 2	Overall												
	2000-01	2010-11	2019-20	2000-01	2010-11	2019-20	2000-01	2010-11	2019-20												
	% Change	% Change	% Change	% Change	% Change	% Change	% Change	% Change	% Change												
Paddy	2611	2802	7.32	2831	3143	11.02	20.38	9154	11236	22.74	10837	12675	16.96	38.46	3506	4010	14.38	3828	4033	5.35	15.03
	3408	3522	3.35	3510	3521	0.31	3.32	15551	15169	-2.46	16472	17616	6.95	13.28	4563	4307	-5.61	4693	5003	6.61	9.64
	165.00	139	-15.76	133	117.30	-11.80	-28.91	461.00	475.00	3.04	491.00	410.40	-16.42	-10.98	2794	3417	22.31	3692	3499	-5.23	25.23
	606.5	482	-20.53	514	293	-43.00	-51.69	222.19	308.99	39.07	274.82	231.52	-15.76	4.20	366	641	74.99	535	790	47.79	115.69
Sugarcane	142.00	70	-50.70	80.00	98.00	22.50	-30.99	925.00	417.00	-54.92	467.00	802.70	71.88	-13.22	6514	5957	-8.55	5838	8191	40.31	25.74

Source: Statistical Abstract of Punjab, various issues.

TABLE 2: CAGR IN AREA, PRODUCTION AND PRODUCTIVITY OF MAJOR CROPS OF PUNJAB (2000-01 TO 2019-20)
(in percent per annum)

Crops	Area			Production			Productivity		
	Period 1 (2000-01 to 2009-10)	Period 2 (2010-11 to 2019-20)	Overall (2000-01 to 2019-20)	Period 1 (2000-01 to 2009-10)	Period 2 (2010-11 to 2019-20)	Overall (2000-01 to 2019-20)	Period 1 (2000-01 to 2009-10)	Period 2 (2010-11 to 2019-20)	Overall (2000-01 to 2019-20)
Paddy	0.856* (0.352)	1.346** (0.117)	1.116** (0.092)	2.671** (0.378)	2.450** (0.423)	1.923** (0.158)	1.799** (0.166)	1.089* (0.368)	0.798** (0.135)
Wheat	0.346** (0.080)	-0.005 (0.031)	0.170** (0.029)	0.247 (0.449)	0.690 (0.676)	1.101** (0.212)	-0.099 (0.443)	0.695 (0.662)	0.929** (0.212)
Maize	-1.321** (0.351)	-1.973** (0.416)	-2.140** (0.149)	2.378 (1.561)	-2.656** (0.445)	0.077 (0.479)	3.749* (1.323)	-0.697 (0.363)	2.265** (0.426)
Cotton	0.25 (1.35)	-7.99** (1.05)	-3.74** (0.64)	6.17 (2.86)	-2.88 (5.65)	-2.48 (1.60)	5.910* (2.197)	5.546 (5.799)	1.308 (1.420)
Sugarcane	-8.22** (1.71)	2.31** (0.48)	-1.55 (0.87)	-8.25** (1.78)	5.99** (1.12)	0.67 (1.13)	-0.037 (0.583)	3.601** (0.835)	2.257** (0.337)

Source: Authors' computation

Note: Figures in parentheses are standard error values, ** and * significant at one and five percent level of significance

Table 3 depicts the inputs used in agriculture during 2000-01 to 2019-20. It is revealed from the table that fertilizer consumption has increased in the state as shown by 32.67 percent change in

2019-20 over 2000-01 while the usage of electricity in agricultural sector increased by 127.56 percent in 2019-20 over 2000-01.

TABLE 3: INPUTS USED IN PUNJAB AGRICULTURE (2000-01 TO 2019-20)

Particulars	2000-01	2009-10	% Change	2010-11	2019-20	% Change	% Change (2019-20 over 2000-01)
Power use (million KWH)	5534.32	10469.30	89.17	10116.65	12594.04	24.49	127.56
Fertilizer consumption (NPK) (metric tonnes)	1448	1768	22.10	1866	1921	2.95	32.67

Source: Statistical Abstract of Punjab, Punjab Economic Survey, various issues

Table 4 shows the growth rate of agricultural inputs in Punjab. During first and overall period, fertilizers and electricity showed positive and

significant growth, which reveals increased use of these inputs in the state.

TABLE 4: CAGR OF AGRICULTURE INPUTS IN PUNJAB (2000-01 TO 2019-20)

(in percent per annum)

Particulars	Period 1 (2000-01 to 2009-10)	Period 2 (2010-11 to 2019-20)	Overall (2000-01 to 2019-20)
Power use	8.338** (0.756)	3.089** (0.445)	4.976** (0.409)
Fertilizer consumption	3.096** (0.439)	-0.017 (0.797)	1.909** (0.277)

Source: Authors' computation

Note: Figures in parentheses are standard error values, ** and * significant at one and five percent level of significance

Table 5 shows the production of fish, milk and eggs in Punjab during 2000-01 to 2019-20. The production of egg in Punjab increased from 29613 to 36996 lakh in numbers during the study period. In percentage terms, the egg production increased by 24.93 percent over the base year. The milk production in the state increased from 7879.87

thousand tonnes to 10425.77 thousand tonnes during the study period. In terms of percentage, the milk production increased by 32.31 percent over the base year. The production of fish in Punjab increased from 201 lakh tonnes to 1386.80 lakh tonnes during the study period which is an increase of 589.95 percent over the base year.

TABLE 5: PRODUCTION OF EGGS, MILK AND FISH IN PUNJAB (2000-01 TO 2019-20)

Particulars	Period-1			Period-2			Overall
	2000-01	2009-10	% Change	2010-11	2019-20	% Change	% Change (2019-20 over 2000-01)
Egg production (lakh)	29613	35434	19.65	37699	36996	-1.86	24.93
Milk production (thousand tonnes)	7879.87	9344.22	18.58	9430.09	10425.77	10.56	32.31
Fish production (lakh tonnes)	201.00	341.29	69.80	532.17	1386.80	160.59	589.95

Source: Statistical Abstract of Punjab, Agricultural Statistics at a Glance, various issues

Table 6 depicts the growth rate in production of eggs, milk and fish in Punjab during 2000-01 to 2019-20. The Compound Annual Growth Rate (CAGR) indicates that the egg production in Punjab increased significantly at the rate of 1.51 percent per annum during the study period. The rate of growth of egg production was worked out to be higher in Period-1 (1.84%) as against the negative growth in Period-2 (-0.20%), but the rate of change was statistically non-significant in both the periods. The CAGR indicates that the milk production in Punjab increased at the rate of 1.41 percent per annum during the overall study period.

The rate of growth of milk production turns out to be statistically significant in all the periods. As against Period-2 (1.09%), the rate of annual growth was higher in Period-1 (2.05%). In case of fish, the compound annual growth rate (CAGR) indicates that the production increased at the rate of 7.344% per annum during the overall study period. The rate of growth of fish production turns out to be statistically significant in all the periods for the state of Punjab. As against the Period-1 (8.694%), the fish production increased significantly at the rate 15.865 percent per annum in Period-2.

TABLE 6: CAGR IN PRODUCTION OF EGGS, MILK AND FISH IN PUNJAB (2000-01 TO 2019-20)

(percent per annum)

Particulars	Period 1 (2000-01 to 2009-10)	Period 2 (2010-11 to 2019-20)	Overall (2000-01 to 2019-20)
Egg production	1.84 (0.86)	-0.20 (0.76)	1.51** (0.31)
Milk production	2.05** (0.22)	1.09** (0.14)	1.41** (0.09)
Fish production	8.694** (2.393)	15.865** (4.020)	7.344** (1.225)

Source: Authors' computation

Note: Figures in parentheses are standard error values, ** and * significant at one and five percent level of significance

Table 7 depicts regression coefficients of different inputs influencing GSDP from agricultural sector in Punjab state. The table reveals that out of seven factors, only four factors; namely net sown area, fertilizers, pesticides and food grain production have significant contribution towards agricultural growth in Punjab. The value of regression coefficients in case of net sown area, fertilizers, pesticides and food grain production estimated as 275.98, 561.37, 26.41 and 2.66, respectively, indicates that unit increase in net sown area, fertilizers, pesticides and food grain production would improve the

agricultural growth by 275.98, 561.37, 26.41 and 2.66 units, respectively. It is very difficult to enhance the net sown area of the state, but the crop productivity can be improved by adjusting the input use pattern of the state. It is well known fact that fertilizer responds well under irrigated conditions. Therefore, there is a scope to enhance agriculture growth by adjusting the present level of fertilizer supply to agriculture sector. Judicious use of pesticides is also recommended to the state farmers for improving gross income from agriculture.

TABLE 7: FACTORS AFFECTING AGRICULTURAL GROWTH IN PUNJAB

Variables	Coefficients	Standard Error	t Stat	P-value	Significance Level
Intercept	-15189.6913	5658.4455	-2.68	0.02	**
Net sown area	275.98	142.52	1.94	0.08	*
Power use	3.19	1.92	1.66	0.13	NS
Fertilizer	561.37	172.15	3.26	0.01	***
Pesticide	26.41	8.13	3.25	0.01	***
Cropping intensity	342.05	1204.05	0.28	0.78	NS
Food grain production	2.66	1.25	2.13	0.06	*
Milk Production	18.88	12.21	1.55	0.15	NS

Source: Authors' computation

Note: *** significant at 1% level, ** significant at 5% level, * significant at 10% level and NS is non- significant.

4. Policy implication and suggestions

- The expansion of area under paddy needs heavy capital investments which is putting the Punjab farmers into debt burden. Therefore, there is need to sustain the cultivation of cotton and maize crop in the context of promoting diversification for the safeguard of natural resources in the Punjab state.
- Owing to low profitability and lack of assured price, the area under maize and cotton has been consistently declining in the state which needs to be revived by developing processing units in the major maize and cotton growing districts.
- Sugarcane has also been showing many fluctuations in area since the last two decades.

The sugarcane acreage improved slightly in Period-2, but it has been showing negative growth in the overall study period. Therefore, the growth of sugarcane also needs to be sustained in the state by implementing some price subsidies to the farmers.

- Declining net availability of agricultural land is another matter of concern in the state. It is very difficult to increase the net sown area, but alternative solutions can be thought of to improve crop productivity by developing new research techniques in the agriculture sector.
- As revealed by the estimates of compound annual growth rate (CAGR), there has been a significant growth of cropping intensity, fertilizer consumption and power use in the Punjab. Therefore, there is further scope to

enhance crop productivity with judicious use of fertilizer and power use. Overtime development of mechanization in agriculture sector and the adequate supply of essential inputs such as fertilizers and electricity has made it possible to have more than two crops from unit land, which is another reason of increasing cropping intensity in the state. Therefore, it is advised to extend these facilities to less developed districts for overall growth of agriculture sector in Punjab.

- As per the growth estimates, allied activities such as fish and milk production have been rising in the state. Thus, there is a need to strengthen the research and extension component for remunerative returns from allied activities in the state.
- As against the growth of agricultural production, the number of regulated markets and sub-yards have declined, which is another major hurdle in the growth of agriculture in the state. Efficient market structure may be developed in the state to manage the gluts of produce during the peak seasons in an efficient manner.

5. Conclusion

Based on the result of analysis, it can be inferred that area under wheat and rice has increased but area of maize, cotton and sugarcane has decreased in 2019-20 as compared to 2000-01, which is mainly due to high focus on food grains self-sufficiency and shift towards high value crops. In case of production, wheat, paddy and cotton recorded positive change in 2019-20 over 2000-01. On the other hand production of maize and sugarcane decreased in 2019-20 over 2000-01. All the major crops showed increase in productivity in 2019-20 as compared to 2000-01 mainly due to

high availability of input in the state. The study also revealed that fertilizer consumption and electricity consumption increased in the state over the years. Electricity consumption, cropping intensity and net irrigated area registered positive growth rate in all the periods. It is also revealed that eggs, milk and fish production has increased over the years in Punjab. The regression analysis revealed that four factors namely net sown area, fertilizers, pesticides and food grain production have significant contribution towards agricultural growth in the Punjab state. The net sown area in Punjab state is very difficult to enhance, but the crop productivity under different crops could be improved by adjusting the input use pattern of the state. As fertilizer responds effectively under irrigated conditions, changing the current level of fertilizer supply to the agriculture sector may boost the agriculture growth.

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Agro-Economic Research

Seed Minikits of Pulses - Program Relevance and Distribution Efficiency in Karnataka

PARMOD KUMAR*

1. Introduction

India is a global leader in terms of production and consumption of pulses. However, India is also a leading importer of pulses because of a widening gap between demand and supply/availability of pulses within the country. Therefore, to raise the domestic production of pulses, the Central and State Governments have initiated various programmes oriented at raising production of pulses through enhancement in area as well as productivity. Seed minikits is one such programme which aims for the introduction and popularization of latest released/pre-released varieties/hybrids not older than 10 years among the farmers free of cost. The size of minikits is 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong, urad and pigeon pea. This quantity would be sufficient to plant 0.2 ha. In addition, under this package, Karnataka State Government is also providing a pamphlet regarding package of practice (POP) and phosphate solubilizing bacteria (PSB) culture of 100 grams per packet per minikit to pulse farmers. The State Government is required to educate/provide training to the farmers to multiply seed minikits seeds for further use.

As the programme is under progress for last three to four years, it is required to see the various aspects of implementation of this programme and how efficiently the distribution of seeds is taking place. There is a need to check whether the scheme is relevant and useful from the viewpoint of farmers. It is also important to examine whether seed minikits have any significant impact on productivity and how much area is being cropped under such seeds. Therefore, keeping the importance in mind, the present study was initiated to examine the need, application, pertinence and efficiency in distribution of seed minikits for three pulse crops; namely red gram (tur), black gram (urad) and green gram (moong).

1.1 Objectives of the study

1. To assess the relevance and the requirement of seed minikits among the farmers.
2. To compare the productivity of pulse crops using seed minikits with the control farmers/non-users.
3. To suggest policy measures to address the efficiency issues in application/distribution of seed minikits.

2. Data source and methodology

Two districts, Mysore as irrigated and Tumkur as dryland were selected based on the available list of households with highest seed minikits distributed in the district during the reference period of 2017-18 and 2018-19. A total number of 231 beneficiaries and 111 non-beneficiaries were selected, making the total number of selected farmers up to 342. Information was compiled on area sown, productivity and resources used for seed minikits pulse crops as well as the reproduced seed pulse crops. The reference period of survey data was 2018-19, i.e., Kharif (July-Nov, 2018), Rabi (Nov, 2018 to March, 2019) and Summer (March-June, 2019).

3. Major findings of the study

Karnataka is the leading producer of pulses and oilseeds in which India has deficit in supply over demand and thereby these commodities constitute major items in the country's import bill. The pulses constituted around 11.6 percent area in India and around 8 percent share of production in 2018-19. Pulses production in Karnataka increased from around 8 lakh tonnes in TE 1990-91 to 18.6

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lakh tonnes in 2018-19. In Karnataka, the share of pulses to gross cropped area was around 20 percent during the early 1990s which came down to less than 15 percent in the late 1990s, but picked up after the beginning of several pulse promotion programmes like ISOPOM and National Food Security Mission which were started in the mid-2000s. During the later years of 2010s, its share surpassed 20 percent and at present is near 25 percent of the gross cropped area in the state.

Among the three selected pulse crops, there was perceptible increase in area and production only in case of red gram (tur) as compared to black gram (urad) and green gram (moong). Area under black gram was almost stagnant at around 1 lakh hectares while the area under green gram increased slightly from 2.4 lakh hectares in TE 1990-91 to around 3.5 hectares in TE 2016-17.

On the other hand, area under red gram, *i.e.*, tur crop increased from around 5 lakh hectares in the early 1990s to 8.7 lakh hectares in TE 2016-17. Similarly, production of black gram and green gram remained stagnant at around 50 thousand and less than 1 lakh tonnes, respectively, in the entire period from 1990-91 to 2016-17. Production of tur on the other hand increased from 1.7 lakh tonnes in TE 1990-91 to more than 5 lakh tonnes in TE 2016-17, an increase by almost three times. Jointly, these three pulse crops contributed around 1/3rd share in area and production of total pulses in the state in the early 1990s whereas their share in area and production increased to slightly less than half by TE 2016-17. The increase in share in both area and production was mainly contributed by red gram whereas share of other two pulses in production declined during the reference period (Table 1).

TABLE 1: AREA AND PRODUCTION OF THREE PULSE CROPS FOR WHICH SEED MINIKITS DISTRIBUTED IN KARNATAKA

Year	Area in lakh hectares, production in lakh tonnes						Percentage of total area and production of pulses						Sum of three pulses	
	Black Gram		Red Gram		Green Gram		Black Gram		Red Gram		Green Gram		%	%
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	area share	production share
TE 90-91	0.00	0.00	4.81	1.67	2.44	0.93	0.00	0.00	20.46	22.12	10.38	12.32	30.84	34.44
TE 91-92	1.16	0.48	4.84	1.8	2.83	1.14	4.77	5.37	19.88	20.13	11.63	12.75	36.28	38.26
TE 92-93	1.18	0.56	4.73	1.48	3.01	1.24	4.80	5.98	19.24	15.80	12.24	13.23	36.27	35.01
TE 93-94	1.16	0.55	1.16	0.55	2.6	0.65	4.83	6.17	4.83	6.17	10.82	7.29	20.47	19.62
TE 94-95	1.17	0.55	1.17	0.55	2.08	0.65	5.02	6.17	5.02	6.17	8.93	7.29	18.97	19.62
TE 95-96	1.19	0.64	1.19	0.64	1.84	0.54	5.32	6.96	5.32	6.96	8.23	5.88	18.88	19.80
TE 96-97	1.31	0.52	1.31	0.52	2.34	0.58	6.25	6.10	6.25	6.10	11.16	6.81	23.66	19.01
TE 97-98	1.39	0.53	1.39	0.53	2.49	0.57	7.45	7.35	7.45	7.35	13.34	7.91	28.24	22.61
TE 98-99	1.42	0.38	1.42	0.38	2.92	0.56	8.07	5.92	8.07	5.92	16.60	8.72	32.75	20.56
TE 99-00	1.31	0.38	1.31	0.38	3.12	0.79	7.25	5.56	7.25	5.56	17.27	11.55	31.77	22.66
TE 00-01	1.33	0.45	1.33	0.45	3.78	1.24	6.89	5.29	6.89	5.29	19.60	14.57	33.39	25.15
TE 01-02	1.42	0.5	1.42	0.5	3.58	1.26	7.27	5.87	7.27	5.87	18.33	14.79	32.87	26.53
TE 02-03	1.57	0.46	1.57	0.46	3.7	0.92	7.85	5.75	7.85	5.75	18.50	11.50	34.20	23.00
TE 03-04	1.56	0.4	1.56	0.4	3.12	0.46	8.03	5.96	8.03	5.96	16.06	6.86	32.12	18.78
TE 04-05	1.46	0.26	1.46	0.26	4.03	0.51	7.25	3.80	7.25	3.80	20.01	7.45	34.51	15.04
TE 05-06	1.28	0.27	1.28	0.27	3.99	0.72	6.44	3.48	6.44	3.48	20.08	9.29	32.96	16.26
TE 06-07	1.3	0.22	1.3	0.22	4.57	0.76	6.04	2.49	6.04	2.49	21.24	8.61	33.32	13.59
TE 07-08	1.4	0.38	1.4	0.38	4.59	0.85	6.24	3.65	6.24	3.65	20.45	8.17	32.93	15.47
TE 08-09	1.4	0.4	1.4	0.4	4.17	0.68	6.14	3.84	6.14	3.84	18.29	6.52	30.57	14.19
TE 09-10	1.31	0.36	1.31	0.36	3.94	0.65	5.66	3.22	5.66	3.22	17.01	5.81	28.32	12.25
TE 10-11	1.19	0.29	1.19	0.29	3.52	0.65	4.85	2.38	4.85	2.38	14.35	5.34	24.05	10.10
TE 11-12	1.13	0.31	1.13	0.31	3.58	0.77	4.48	2.44	4.48	2.44	14.18	6.05	23.13	10.93
TE 12-13	1.1	0.44	1.1	0.44	2.9	0.79	4.49	3.25	4.49	3.25	11.83	5.84	20.81	12.35

Year	Area in lakh hectares, production in lakh tonnes						Percentage of total area and production of pulses						Sum of three pulses	
	Black Gram		Red Gram		Green Gram		Black Gram		Red Gram		Green Gram		%	%
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	area share	production share
TE 13-14	1.02	0.46	4.52	2.15	2.63	0.69	4.33	3.37	19.21	15.76	11.18	5.06	34.72	24.19
TE 14-15	0.94	0.41	4.71	2.29	2.53	0.62	3.99	2.83	19.98	15.79	10.73	4.28	34.71	22.90
TE 15-16	0.88	0.32	7.36	4.35	3.1	0.59	3.46	2.33	28.92	31.61	12.18	4.29	44.56	38.23
TE 16-17	0.83	0.30	8.66	5.42	3.44	0.71	3.07	2.11	32.06	38.12	12.74	4.99	47.87	45.22

Source: DES, Govt. of Karnataka.

Against mostly the negative growth in area of rice and course cereals, pulses saw significant negative growth in area in the decade of 1988-89 to 1997-98 but underwent significant positive growth in area at the rate of 2.5 and 3 percent per annum during the 1998-99 to 2007-08 and 2008-09 to 2017-18, respectively (Table 2). Against the negative trends in area, the yield growth was observed to be positive throughout the period of three decades in pulses but the increase in area was consistent with significant growth, the yield rate was insignificant throughout the three decades' period with volume remaining only 1-2 percent per annum. The lack of significant positive growth in yield in pulses was possibly caused by the dry-land nature of pulses in the state and also due to rising uncertainty in rainfall pattern and fluctuating temperature due to the effect of climate change in the recent past.

Summarizing the growth rates in area and yield of three individual pulse crops namely, black gram, red gram and green gram, very interesting statistics can be seen from Table 2. Whereas black gram observed significant positive growth in area during the first decade, the area growth in other two pulses remained negative and insignificant during this period. On the opposite, growth rate in area of black gram during the next two decades remained insignificant and negative or negligible. Growth in the area under red gram and green gram during the next two decades, on the other hand, was positive and mostly significant. The above analysis of area growth indicates some diversification within pulses happening in Karnataka from black gram towards red gram and green gram. Yield growth in the three pulses mostly remained insignificant although the growth rate was high and positive in all the three pulses during the last decade.

TABLE 2: GROWTH RATE IN AREA AND YIELD RATE OF MAJOR FOOD GRAIN CROPS IN KARNATAKA (%)

Year	Rice		Course cereals		Food grains		Pulses		Black Gram		Red Gram		Green Gram	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
1988-89 to 1997-98	1.388 (3.16)	2.19 (5.35)	-1.30 (-3.4)	4.09 (3.76)	-1.38 (-4.9)	4.03 (5.17)	-3.46 (-3.4)	1.24 (0.63)	4.14 (3.38)	-11.0 (-1.4)	-2.54 (-1.6)	1.51 (0.41)	-0.59 (-0.2)	-7.59 (-3.4)
1998-99 to 2007-08	-0.39 (-0.3)	1.60 (0.87)	-0.77 (-1.4)	2.99 (1.21)	0.21 (0.42)	1.73 (0.78)	2.43 (3.53)	0.69 (0.35)	0.62 (0.4)	-4.54 (-1.0)	3.08 (3.96)	3.33 (1.18)	4.48 (1.71)	-6.04 (-1.1)
2008-09 to 2017-18	-4.81 (-7.6)	1.04 (1.73)	-1.33 (-3.9)	0.25 (0.22)	-0.59 (-1.3)	-0.58 (-0.6)	2.93 (2.66)	2.32 (1.33)	-1.74 (-0.8)	8.86 (1.99)	4.33 (2.05)	4.08 (1.51)	2.21 (0.72)	5.74 (1.4)
2012-13 to 2013-14**	4.77	1.37	-0.40	13.28	3.39	7.74	10.58	6.58	-7.27	1.74	24.85	28.57	82.86	-14.8
2013-14 to 2014-15**	-1.05	0.16	-4.07	6.08	-4.67	4.29	-7.40	-6.21	-31.37	-38.80	-11.65	-8.68	-17.8	-20.4
2014-15 to 2015-16**	-16.29	1.92	-3.76	-16.10	2.00	-19.85	22.05	-32.87	30.00	-8.43	-9.75	-43.43	32.32	-37.40
2015-16 to 2016-17**	-6.85	-7.44	-1.37	-4.53	0.23	-1.53	5.06	45.27	-3.30	77.86	84.78	103.3	20.60	118.2
2016-17 to 2017-18**	-3.97	20.61	8.15	15.43	4.10	15.65	1.96	10.12	54.55	3.56	-27.10	15.05	-5.48	23.90

Source: DES, Govt. of Karnataka.

Note: *The growth rates for the decennial period are based on semi log time trend and the figures in parentheses are respective 't' values,

** Growth rates are based on annual averages.

Out of around 1.5 lakh seed minikits distributed for pulses in Karnataka, around 57 percent alone were distributed for the red gram which is one of the most important pulse crops grown in the state. Red gram was followed by black gram and green gram with a share of around 19.6 and 18.6 percent, respectively. The remaining pulses shared around 5 percent share of seed minikits distributed in the state.

Looking at the distribution of seed minikits of pulse crops together for the three years (from 2017 to 2019) in different districts in the state, the highest number of minikits were distributed in Gulbarga district (14.4 percent of total minikits) followed by Bijapur district (9.8 percent), Bidar (8.3 percent), Yadgir (6.8 percent), Raichur (5.7 percent), Tumkur (5.3 percent), Chitradurga (4.8 percent), Chamarajnagar (3.9 percent), Belgaum (3.8 percent) and Mysore (3.7 percent). Based on different agro-climatic regions, Mysore was selected as irrigated district and Tumkur as dryland district for the primary survey for this study. A total number of 342 farmers consisting of 231 beneficiary households and 111 non-beneficiary households were selected based on the list of beneficiaries provided by the officials of the Agriculture Department in the concerned districts.

3.1 Findings based on primary survey

Among the selected sample, beneficiary households constituted 67.5 percent of the sample while control group constituted 32.5 percent. Across various sizes of holdings, marginal and small farmers constituted 34 percent and 45 percent of the sample, respectively, while medium and large farmers constituted 19 percent and 3 percent, respectively. It is notable here that the seed minikits scheme is basically meant for SC/ST, women, and small and marginal farmers. Among the beneficiaries, small and marginal farmers constituted a share of 31 percent and 45 percent, respectively, while medium and large farmers had 24 percent share in the sample.

The average family size of the household was 2.63 members per household. Sample farmers had around 29 years of farming experience and

around 2.3 members of the family were engaged in farming activities. As high as 93 percent of the heads of the sample were male and only 7 percent were female. On an average, more than 70 percent of the respondents were in the age group of 30-60 years and more than 20 percent were above 60 years. Among the selected households, around 20 percent of the respondents were illiterate while around 55 percent were matriculate or below. Only around 6 percent were graduates and 5 percent were post-graduates. The lower level of education also reveals poor economic condition of the sample households. The sample had representation of General category (57 percent), OBC (20 percent), Scheduled Castes (15 percent) and Scheduled Tribes (8 percent). Although the seed minikits scheme was targeted towards SC and ST farmers, the majority of sample belonged to the general category households. This indicates that either there was misappropriation of the programme by general category households or the allocation of seed minikits by authorities was not implemented as per the basic objective of the scheme.

Analysis of occupation of head of the households indicated that almost all households were engaged in agriculture and allied activities as their main occupation. Only less than one percent were engaged in agriculture labour activities. The annual income of the selected households on average was measured at Rs. 1.5 lakh which varied from less than Rs. 1 lakh for marginal farmers, Rs. 2 lakh for medium farmers and above Rs. 7 lakh for the large farmers. Small and marginal farmers depended much on the subsidiary occupation for their livelihood as compared to medium and large farmers.

On an average, the net operated area per household of the selected sample was 4.14 acres. The cropping intensity was measured only 1.3. The substantially low cropping intensity among the sample farmers was because of predominance of dryland nature of the agriculture in which there was preponderance of pulse crops in the cropping pattern. Almost 60 percent of the net operated area among the sample households was under rainfed conditions. The rest of 40 percent was irrigated, mainly by bore wells and canal.

Among the selected farmers, pulses occupied around 40 percent of the total cropped area with proportion of around 10 percent each by red gram, green gram and black gram and additional 10 percent area occupied by other pulses like cowpeas, horse gram and field beans. Cereals, including paddy and ragi, accounted for 33 percent area and perennials occupied 14 percent of area. In addition to above mentioned crops, around 13 percent area was covered by other crops which included oilseeds and other commercial crops.

3.3.1 Productivity comparison of seed minikits

On an aggregate, area under the selected pulse crops averaged at around slightly less than one acre per household among the beneficiary farmers and slightly above one acre among the control group farmers who were selected from the vicinity of the beneficiary farmers so that there is no bias in the comparison of the two categories. The value of crop productivity per acre was much higher for the beneficiary farmers as compared to control group. Average value of output per acre for the beneficiary farmers was Rs. 16.5 thousand compared to Rs. 12.7 thousand for the control group farmers. Across various farm size holdings, the productivity was higher for the beneficiary farmers with only exception of large farmers whose productivity was significantly less than control farmers. The cost of production was also slightly higher for the beneficiary farmers compared to control group with the exception of small farmers.

The overall returns from pulse crops were much higher for beneficiary farmers compared to control group. The beneficiary farmers' per acre earning from pulses was Rs. 10 thousand as compared to less than Rs. 7 thousand for control farmers group. The higher earnings per acre by the beneficiary farmers were across all size of holdings except the case of large farmers. In comparison to productivity, cost and returns, price of pulses was not significantly different among the two groups, except the case of large farmers.

Looking at individual crops, per household area under red gram using seed kits averaged at 0.98 acres compared to control group farmers

using seed from the market that averaged at 1.01 acres. The value of output per acre averaged around Rs. 18 thousand for beneficiaries and Rs. 14 thousand for the control group. Net returns per acre were observed to be Rs. 11 thousand for beneficiary and Rs. 7 thousand for the control group farmers. The price received for red gram averaged at Rs. 5.4 thousand per quintal for beneficiary farmers compared to Rs. 5.2 thousand for control group. Black gram and green gram also observed similar trends as interpreted for the case of red gram. The area cultivated per household by beneficiary farmers averaged at 0.8 acres and 0.9 acres for black and green gram, respectively, by beneficiary farmers compared to 1.2 acres and 1.1 acres for the control group. Productivity per acre averaged at Rs. 16 thousand and Rs. 14 thousand for beneficiary farmers compared to Rs. 14 thousand and Rs. 11 thousand, respectively, in the case control group for black and green gram. As in the case of red gram, price differences were not significant in black and green gram as well. The net returns were found higher among the beneficiary farmers compared to control group for both these pulse crops also. In the case of black gram, net returns per acre averaged at Rs. 9.7 thousand compared to Rs. 7.9 thousand for control group. Similarly for green gram, average returns were observed at Rs. 8.3 thousand per acre for beneficiary farmers compared to Rs. 5.7 thousand per acre for the control group farmers. The beneficiary farmers across various categories also by and large observed higher returns compared to control group.

Thus, from this comparison, one can conclude that the overall economy of seed minikits (SMK) appears to be advantageous to the farmers and need to be promoted on larger scale. It is found that although the overall cost of production of SMK was not less than the control group but with the advantage of better productivity, the overall returns were much better for SMK farmers compared to control group farmers. The control group farmers were growing same pulses using seeds either bought from the market or using home grown seeds which essentially were that of older variety. Compared to this, SMK farmers used seeds supplied through seed minikits which

were the latest variety provided by the research centres or agricultural universities.

The main components of production costs were land preparation, seed, farmyard manure/organic fertilizer and labour charges. Labour component alone constituted almost 45-50 percent cost of production. The second most important component was organic manure/biofertilizer and land preparation with each constituting around 15-20 percent share. Unlike labour, biofertilizer and land preparation cost, the seed cost was borne only by the control group farmers as SMK beneficiary farmers obtained the seed free of cost. Its share in the total cost was around 12 to 15 percent for all the three pulse crops. Fertilizer and irrigation which generally constitute very high share in total cost of production was found insignificant in pulses. Pulses are either grown in dryland conditions as was the case in Tumkur district or even if they are cultivated in irrigated conditions as in Mysore, the electricity was available free of cost in Karnataka. Regarding fertilizer, generally pulses are grown in organic conditions or very miniscule amount of chemical fertilizers are used in raising pulse crops. Thus, to conclude, land preparation, farm yard manure and labour charges were the major items of cost of production among both beneficiary and control group farmers whereas seed cost was incurred only by control farmers. The cost of fertilizer, pesticides and irrigation was almost negligible and for that reason, the cost of production for pulses was much lower compared to what farmers incurred in food grains, oilseeds and commercial crops.

On an aggregate, only 8.8 days of employment per acre was generated by pulses among SMK farmers and 7.4 days among control group farmers. Regarding marketing of pulse crops, 60 to 70 percent of the produce was sold by the selected farmers to wholesale market or what is better known as Agriculture Produce Market Committee Mandis (APMCs). Rest of 30-40 percent produce was sold through traders or merchants who are intermediaries operating mostly at the farm gate level itself. Among the selected farmers, there was no government procurement as none of the selected farmers sold their produce through any government agency.

3.1.2 Efficiency of seed minikits distribution in Karnataka

Against the criteria of distribution of seed minikits among scheduled caste, scheduled tribe, women, and small and marginal farmers, scheduled caste and scheduled tribe farmers consisted only 11 percent in the selected sample and, small and marginal farmers consisted less than 20 percent. The selection of farmers seems to be based on first come first serve as almost 70 percent of the farmers indicated that the criterion for seed minikits distribution was any interested farmers, first come first served. The women farmers obtaining SMK was almost negligible as only one farmer got SMK based on women criterion in the two selected districts. Thus, comparing the distribution of SMK with the scheme guidelines, the distribution was complete violation of the eligibility criterion.

Seed minikits were majorly distributed by the Agricultural Department, Government of Karnataka. Out of selected beneficiaries, almost all of them submitted Aadhar card and pahani or the land records. On an aggregate, beneficiary households received 4.1 kg of red gram seed, 4.4 kg of green gram seed and 4.3 kg of black gram seed through the minikits. There were only slight variations in the quantity of seeds in the minikits across various farm size holdings. Using the seeds provided through minikits, households sowed 0.98 acres of red gram, 0.93 acres of green gram and 0.81 acres of black gram area on average. All the three crops using SMK were grown in the kharif season. Out of the total quantity produced by the beneficiary households, a part of the output was used by them for replicating the area under pulses in the next season. Out of 3.6 quintals of output produced using seed minikits in the case of red gram, 17.5 kg was used as seed for sowing in the next season by the selected beneficiary households. Similarly, in the case of green gram, out of 2.9 quintals of output from seed minikits, 18.1 kg was used for the purpose of seeds in the next season while in the case of black gram, 15.9 kg was used for seed out of total production of 2.5 quintals per household. Thus, the basic objective of the scheme of replicating seeds through beneficiary farmers seem to be working well in all the three crops in the study area.

According to the guidelines, the kit should contain Package of Practice (POP), 100 gms of PSP culture and 100 gms of Rhizobium along with 4 kgs of seed. Almost 95 percent of the beneficiaries received POP and rhizobium whereas 100 percent of the beneficiaries received PSP culture in the kit. Whereas the beneficiary farmers obtained seeds in the SMK free of cost, the non-beneficiary farmers had to pay around Rs. 80 to Rs. 92 per kg for the seed. Both beneficiary and non-beneficiary farmers travelled 8 to 10 kilometers to access the seed and the transportation cost was worked out Rs. 20 per kit for the beneficiaries (for 4 kg of seed) and Rs. 18 per kg for the non-beneficiary households.

The selected farmers obtained awareness about the scheme mostly through the Raitha Samparka Kendra (RSK), farmer facilitator and other fellow farmers. Around 79 percent of the selected farmers obtained basic information about the programme from Agriculture Officer working in Raitha Samparka Kendra (RSK). Farmer facilitators and fellow farmers were the other major sources through which rest of the 20 percent households obtained knowledge about the seed minikits programme.

Around 97 percent respondents pointed out that the seed minikits and the material received in it was really useful for growing pulse crops. Majority of the beneficiary farmers (90 percent) pointed out that the yield increased when they used the seeds distributed through minikits and 55 percent were of the opinion that there is quality difference in the seeds over what they were using previously. Another 10 percent beneficiaries pointed out that using the seed from the minikits increased profitability of their crop, either through better yield or through better price. Around 60 percent of the respondents pointed out that the seeds supplied through minikits were adequate while other 40 percent pointed out that the quantity was inadequate as 4 kg of seeds which were supplied though seed minikits were sufficient only to sow half an acre of pulse crops. They also opined to increase the supply of seeds distributed through these kits. Further, the respondents expressed their opinion for increasing the quantity with 22 percent of them requiring 5 to 10 kg of seeds to be distributed through the kit instead of 4 kg.

Largely, the respondents (84 percent) were satisfied with the quality of seeds distributed as they opined that the quality was better than the seeds available in the market. It is just to note that the seeds distributed in kit were directly fetched from Karnataka State Seed Corporation and National Seed Corporation (NSC) and were distributed by the Agriculture Department. The respondents expressed that seeds distributed possessed good germination, good grain size with good grain quality and the seeds were drought and disease resistant. However, 16 percent of the respondents were dissatisfied with the quality of the seeds. Regarding timeliness of the seed minikits distribution, almost 90 percent of the beneficiary respondents were of the opinion that the kits were distributed on time while only 10 percent pointed out that the kits were not received on time. A few respondents (3 percent) opined that kits were distributed with a delay of one to two weeks after beginning of the sowing season while 5 percent pointed out that the delay was as high as 1 to 2 months.

Around 90 percent of the respondent farmers indicated that they didn't encounter any kind of issues or have concern relating to the distribution of seed minikits. Of the 10 percent of farmers who indicated having faced problems or issues in availing benefits of the scheme, 7 percent indicated having documentations and procedural issues and remaining 3-4 percent farmers indicated that the seed supplied was of poor quality and they faced shortage in sowing the seed for the desired land kept for the subjective crop. Thus, from the above analysis one can conclude that although a few farmers faced some problems in availing the benefits of the scheme, but by and large the distribution of seed minikits was smooth, timely and advantageous to the beneficiaries.

4. Policy suggestions

Among the measures required to improve the scheme, a few are indicated here:

- Increase in the quantity of seeds supplied and making the distribution of seed minikits timely will make the scheme much more effective.

- The sample beneficiaries indicated that other crops must be included under the ambit of this scheme. Although rice and other nutri cereals are covered under this scheme in Karnataka, however, the selected beneficiaries obtained the benefit of only one pulse crop.
- Creating awareness about the scheme will broaden its scope and help in making the scheme more inclusive. Although, the scheme was mainly targeted to SC/ST, women and other poor and small and marginal farmers, however, due to lack of knowledge among those classes, the targeted groups have not been very well represented in the scheme.
- Providing technical guidance along with kits and methods of demonstration and how to use the rhizobium and PSB which are provided in the minikit will benefit farmers and guide them to use the kits more appropriately.
- Improved variety of seeds which are of short duration, are drought and pest resistant need to be supplied. ICT and market information about the crops (seeds) supplied in the kit must be provided.
- Provision of wider publicity of the scheme by reaching out to more and more farmers especially the weaker sections of the farming community will make the scheme more inclusive. In this regards, use of ICT and mobile phone message, voice and video call could prove very informative to the farmers. Using local newspapers and local radio and television stations for spreading information would be much useful.

- Imparting training and information through extension services could broaden the reach of the scheme. Similarly, personal meetings and demonstrations can also increase the reach to the farmers.

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Commodity Review

Foodgrains

Procurement of Rice

The total procurement of rice during kharif marketing season 2021-22 up to 29.04.2022 is 51.05 million tonnes as against 47.36 million tonnes during the corresponding period of last year.

The details are given in Table 1. A comparative analysis of procurement of rice for the period of marketing season 2021-22 (up to 29.04.2022) and the corresponding period of last year is given in figure 1. The percentage share of different states in procurement of rice has been given in figure 2.

TABLE 1: PROCUREMENT OF RICE IN MAJOR STATES

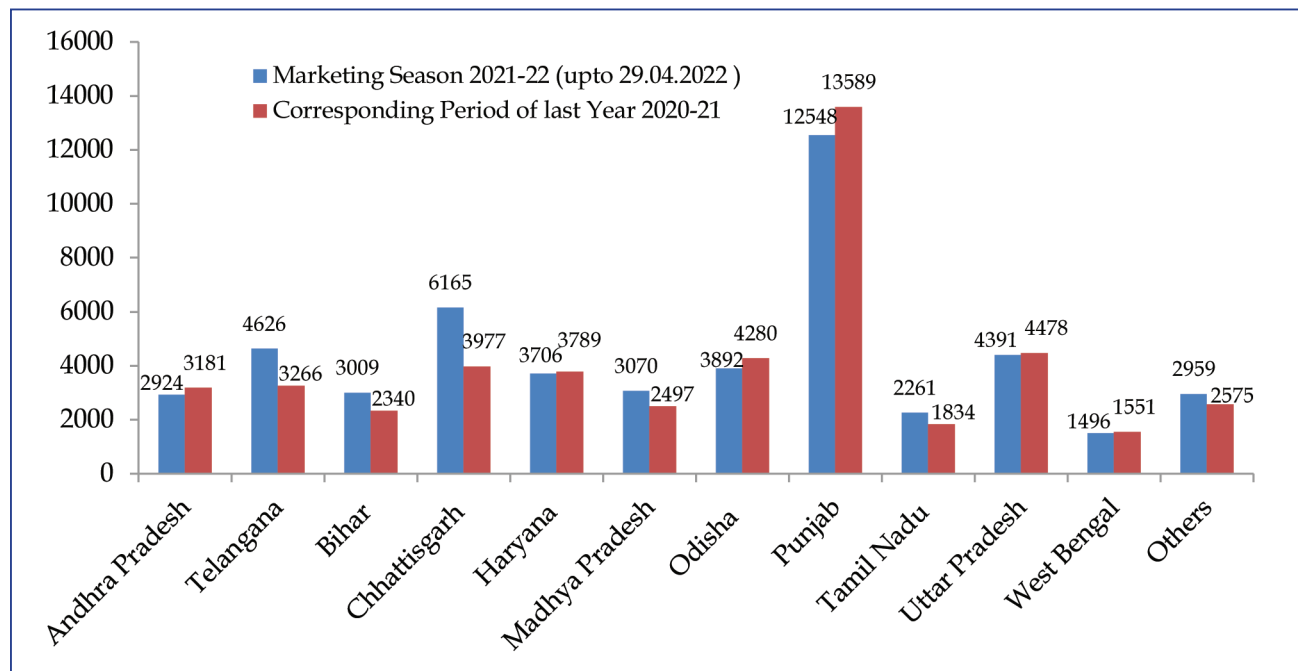
(In thousand tonnes)

State	Marketing Season 2021-22 (upto 29.04.2022)		Corresponding Period of last Year 2020-21	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Andhra Pradesh	2924	5.7	3181	6.7
Telangana	4626	9.1	3266	6.9
Bihar	3009	5.9	2340	4.9
Chhattisgarh	6165	12.1	3977	8.4
Haryana	3706	7.3	3789	8.0
Madhya Pradesh	3070	6.0	2497	5.3
Odisha	3892	7.6	4280	9.0
Punjab	12548	24.6	13589	28.7
Tamil Nadu	2261	4.4	1834	3.9
Uttar Pradesh	4391	8.6	4478	9.5
West Bengal	1496	2.9	1551	3.3
Others	2959	5.8	2575	5.4
All India Total	51047	100.0	47357	100.0

Source: Department of Food & Public Distribution, Govt. of India.

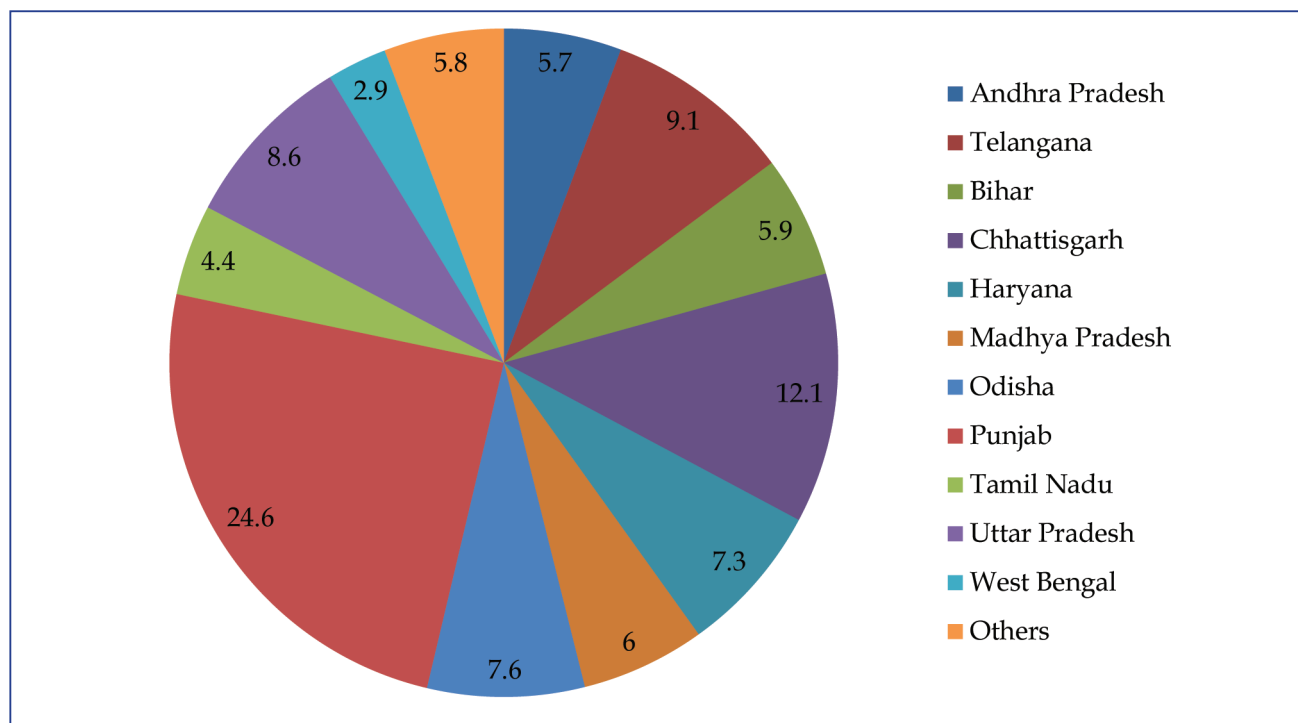
Figure 1: Procurement of Rice in major States

(In thousand tonnes)



Source: Department of Food & Public Distribution, Govt. of India.

Figure 2: Percentage Share of Different States in Procurement of Rice during Marketing Season 2021-22 (up to 29.04.2022)



Source: Department of Food & Public Distribution, Govt. of India.

Procurement of Wheat

The total procurement of wheat during rabi marketing season 2022-23 up to 28.04.2022 is 15.69 million tonnes as against 25.87 million tonnes during the corresponding period of last year.

The details are given in Table 2. Figure 3 depicts the comparison of procurement of wheat during the marketing season 2022-23 (up to 28.04.2022) with the corresponding period of last year. The percentage share of different states in procurement of rice has been given in figure 4.

TABLE 2: PROCUREMENT OF WHEAT IN MAJOR STATES

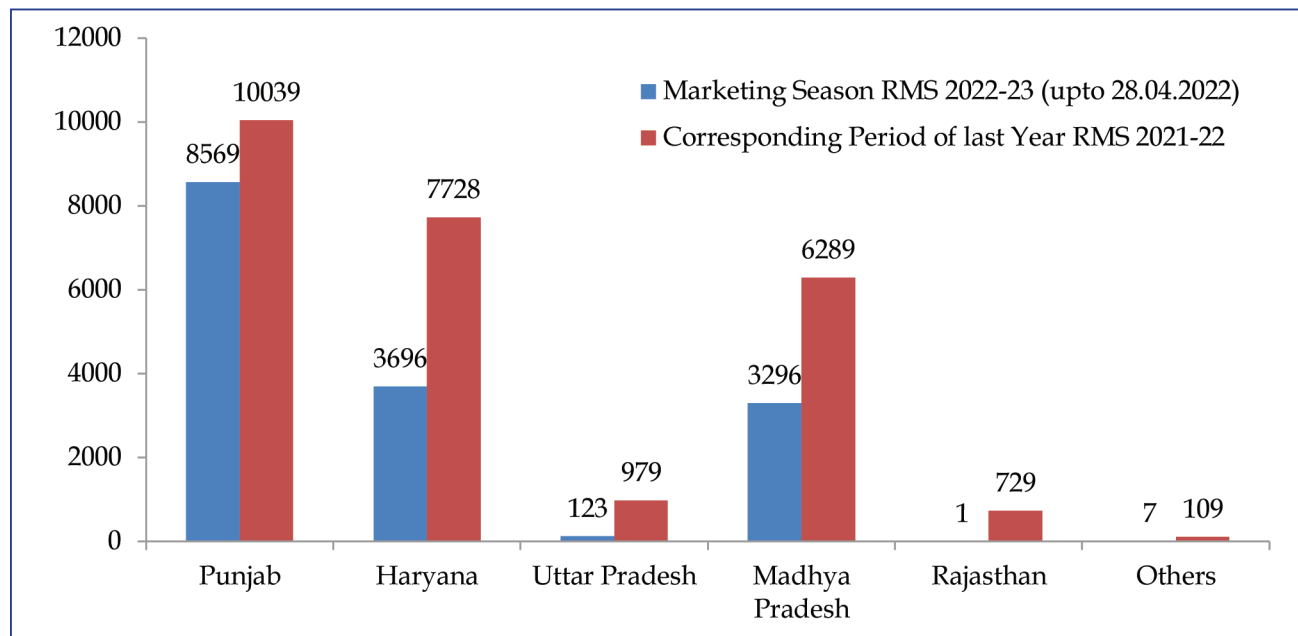
(In thousand tonnes)

State	Marketing Season RMS 2022-23 (upto 28.04.2022)		Corresponding Period of last Year RMS 2021-22	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Punjab	8569	54.61	10039	38.80
Haryana	3696	23.55	7728	29.87
Uttar Pradesh	123	0.78	979	3.78
Madhya Pradesh	3296	21.01	6289	24.31
Rajasthan	1	0.00	729	2.82
Others	7	0.05	109	0.42
All India	15692	100.00	25873	100.00

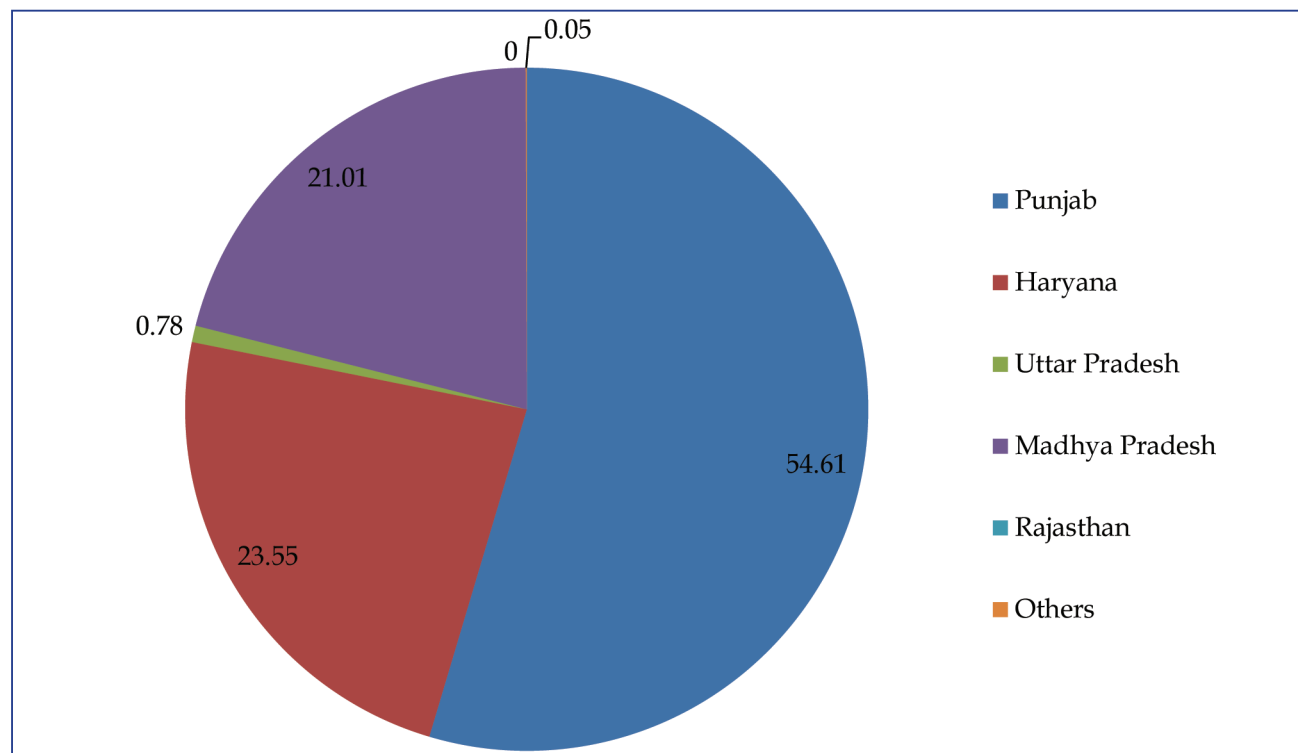
Source: Department of Food & Public Distribution, Govt. of India.

Figure 3: Procurement of Wheat in major States

(In thousand tonnes)



Source: Department of Food & Public Distribution, Govt. of India.

Figure 4: Percentage Share of Different States in Procurement of Wheat during Marketing Season 2022-23 (up to 28.04.2022)

Source: Department of Food & Public Distribution, Govt. of India.

Commercial Crops

Oilseeds

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 227.2 in April, 2022, showing an increase of 0.26 percent over the previous month and increase of 16.10 percent over the corresponding month of previous year.

The WPI of all individual oilseeds showed a mixed trend. The WPI of groundnut seed (1.24 percent), cotton seed (0.57 percent), gingelly seed (sesamum) (0.48 percent), safflower (1.86 percent) and soyabean (1.01 percent) increased over the previous month. However, the WPI of rape & mustard seed (1.23 percent), copra (coconut) (1.28 percent), niger seed (7.73 percent), and sunflower (1.83 percent) decreased over the previous month.

Manufacture of Vegetable and Animal Oils and Fats

The WPI of vegetable and animal oils and fats as a group stood at 210.2 in April, 2022, which shows an increase of 5.00 percent over the previous month. Moreover, it increased by 15.05 percent over the corresponding month of the previous year. The WPI of soybean oil (4.77 percent), sunflower oil (7.07 percent), groundnut oil (4.98 percent), and cotton seed oil (2.80 percent) increased over the previous month. However, the WPI of mustard oil (0.59 percent), rapeseed oil (0.63 percent) and copra oil (0.05 percent) decreased over the previous month.

Fruits & Vegetable

The WPI of fruits & vegetable as a group stood at 198.8 in April, 2022, showing an increase of 11.37 percent over previous month and an increase of 16.87 percent over the corresponding month of the previous year.

Potato

The WPI of potato stood at 194.5 in April, 2022, showing an increase of 8.54 percent over the previous month. Moreover, it increased by 19.84 percent over the corresponding month of previous year.

Onion

The WPI of onion stood at 157.5 in April, 2022, showing a decrease of 27.95 percent over the previous month and a decrease of 4.02 percent over the corresponding month of previous year.

Condiments & Spices

The WPI of condiments & spices (group) stood at 173.8 in April, 2022, showing an increase of 0.52 percent over the previous month and an increase of 14.64 percent over the corresponding month of previous year. The WPI of black pepper increased by 0.48 percent, chillies (dry), it decreased by 1.05 percent and for turmeric, it decreased by 4.66 percent over the previous month.

Tea

The WPI of tea stood at 169.1 in April, 2022, showing an increase of 23.07 percent over the previous month and a decrease of 7.70 percent over the corresponding month of previous year.

Coffee

The WPI of coffee stood at 138.3 in April, 2022, showing no change over the previous month. However, there is an increase of 46.04 percent over the corresponding month of previous year.

Sugarcane

The WPI of sugarcane stood at 199.8 in April, 2022, showing no change over the previous month. However, there is an increase of 1.78 percent over the corresponding month of previous year.

Raw Cotton

The WPI of raw cotton stood at 208.2 in April, 2022, showing an increase of 12.54 percent over the previous month and an increase of 81.20 percent over the corresponding month of previous year.

Raw Jute

The WPI of raw jute stood at 291.4 in April, 2022, showing a decrease of 0.07 percent over the

previous month and an increase of 0.52 percent over the corresponding month of previous year.

Wholesale Price Index of commercial crops is given in Table 3. A graphical comparison of WPI

for the period of April, 2022 and March, 2022 is given in figure 5 and the comparison of WPI during the April, 2022 with the corresponding month of last year has been given in figure 6.

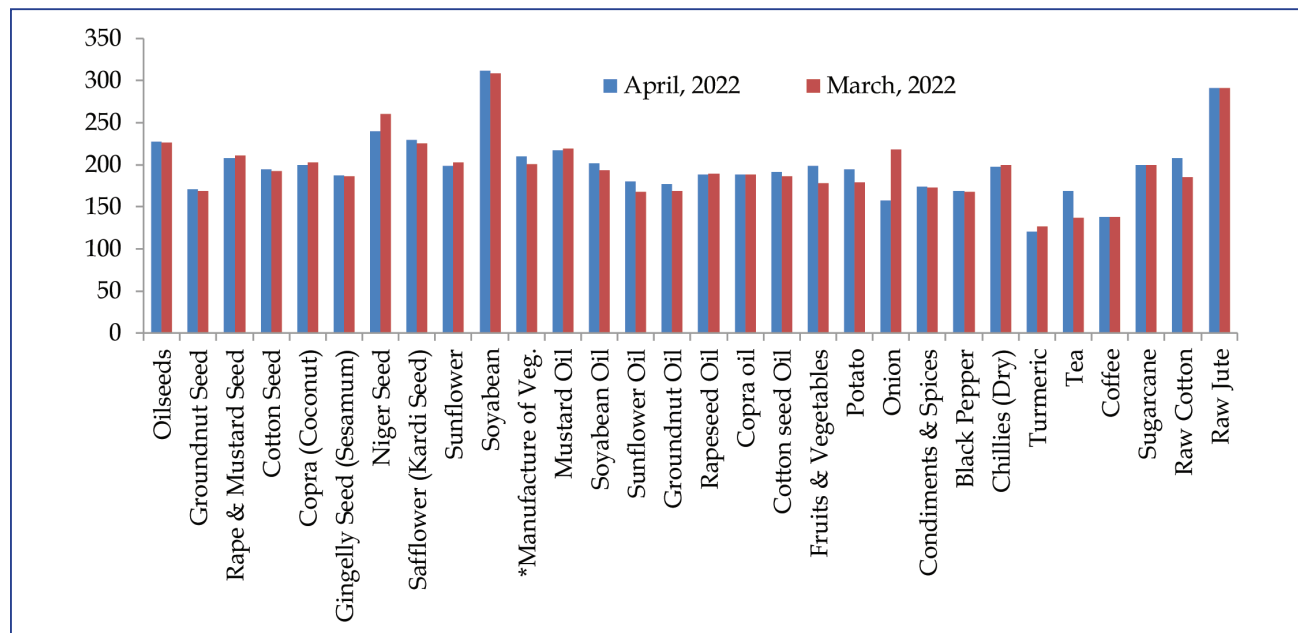
TABLE 3: WHOLESALE PRICE INDEX OF COMMERCIAL CROPS

(Base Year: 2011-12)

Commodity	April, 2022	March, 2022	April, 2021	Percentage variation over the	
				Month	Year
Oilseeds	227.2	226.6	195.7	0.26	16.10
Groundnut Seed	171.2	169.1	167.7	1.24	2.09
Rape & Mustard Seed	208.3	210.9	181.1	-1.23	15.02
Cotton Seed	194.0	192.9	163.2	0.57	18.87
Copra (Coconut)	200.0	202.6	218.5	-1.28	-8.47
Gingelly Seed (Sesamum)	187.2	186.3	178.6	0.48	4.82
Niger Seed	239.8	259.9	233.1	-7.73	2.87
Safflower (Kardi Seed)	229.6	225.4	177.0	1.86	29.72
Sunflower	198.9	202.6	169.8	-1.83	17.14
Soyabean	311.3	308.2	244.6	1.01	27.27
Manufacture of Vegetable and Animal Oils and Fats	210.2	200.2	182.7	5.00	15.05
Mustard Oil	217.6	218.9	197.4	-0.59	10.23
Soyabean Oil	202.2	193.0	173.0	4.77	16.88
Sunflower Oil	180.1	168.2	172.4	7.07	4.47
Groundnut Oil	177.1	168.7	168.4	4.98	5.17
Rapeseed Oil	188.4	189.6	151.4	-0.63	24.44
Copra oil	188.3	188.4	199.8	-0.05	-5.76
Cotton seed Oil	191.2	186.0	170.6	2.80	12.08
Fruits & Vegetables	198.8	178.5	170.1	11.37	16.87
Potato	194.5	179.2	162.3	8.54	19.84
Onion	157.5	218.6	164.1	-27.95	-4.02
Condiments & Spices	173.8	172.9	151.6	0.52	14.64
Black Pepper	168.7	167.9	130.3	0.48	29.47
Chillies (Dry)	197.4	199.5	156.8	-1.05	25.89
Turmeric	120.7	126.6	132.6	-4.66	-8.97
Tea	169.1	137.4	183.2	23.07	-7.70
Coffee	138.3	138.3	94.7	0.00	46.04
Sugarcane	199.8	199.8	196.3	0.00	1.78
Raw Cotton	208.2	185.0	114.9	12.54	81.20
Raw Jute	291.4	291.6	289.9	-0.07	0.52

Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.

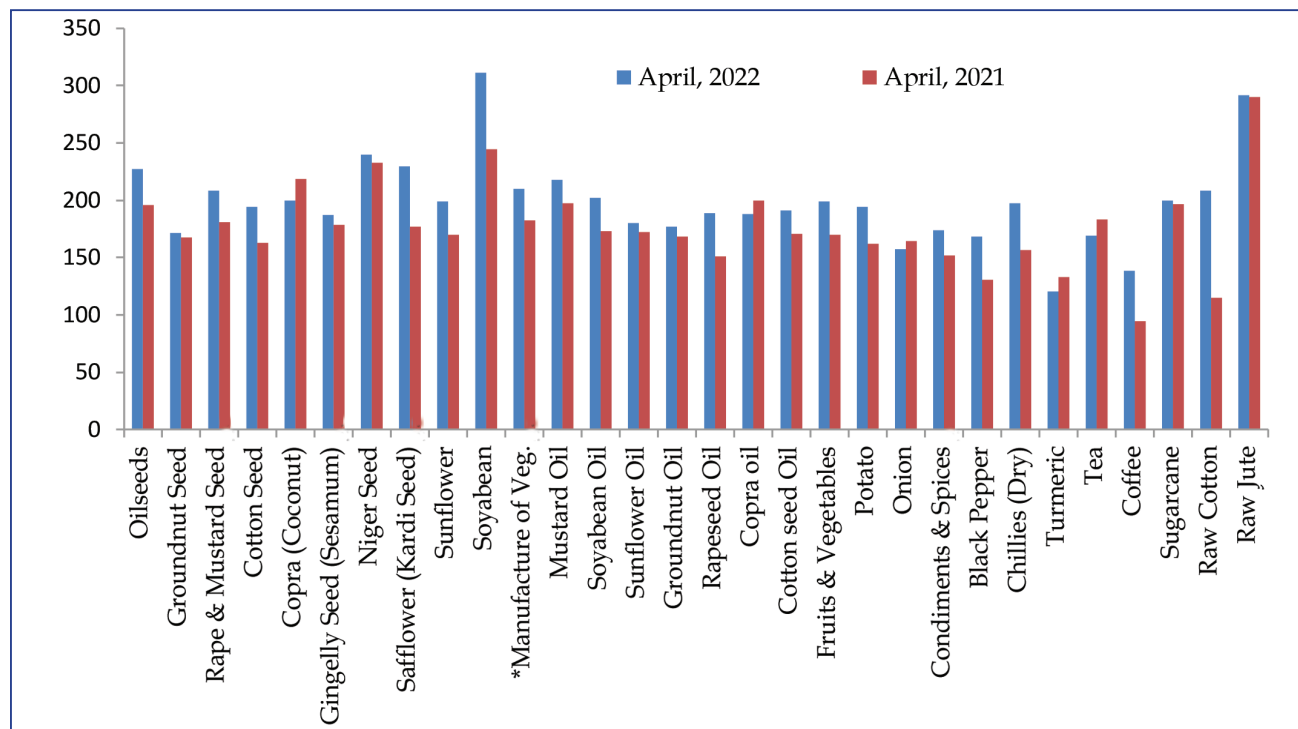
Figure 5: WPI of Commercial Crops during April, 2022 and March, 2022



*Manufacture of Vegetable And Animal Oils And Fats.

Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.

Figure 6: WPI of Commercial Crops during April, 2022 and April, 2021



*Manufacture of Vegetable And Animal Oils And Fats.

Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.

Statistical Tables

Prices

WHOLESALE PRICES OF CERTAIN AGRICULTURAL COMMODITIES AND ANIMAL HUSBANDRY PRODUCTS AT SELECTED CENTRES IN INDIA

Commodity	Variety	Unit	State	Centre	Apr-22	Mar-22	Apr-21
Wheat	PBW 343	Quintal	Punjab	Amritsar	2015	2380	1975
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	2100	2060	1975
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	2098	2050	NT
Jowar	-	Quintal	Maharashtra	Mumbai	3500	2700	3600
Gram	No III	Quintal	Madhya Pradesh	Sehore	4351	4616	5001
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	2125	1840	1520
Gram Split	-	Quintal	Bihar	Patna	6350	6450	6420
Gram Split	-	Quintal	Maharashtra	Mumbai	5900	6000	6300
Arhar Split	-	Quintal	Bihar	Patna	9450	9420	9780
Arhar Split	-	Quintal	Maharashtra	Mumbai	8900	9500	9500
Arhar Split	-	Quintal	NCT of Delhi	Delhi	9600	9600	9900
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	8500	8200	9000
Gur	-	Quintal	Maharashtra	Mumbai	4600	4600	4600
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4800	4800	4500
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2950	2850	2700
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	6500	6650	6500
Mustard Seed	Black	Quintal	West Bengal	Raniganj	6500	6650	5400
Mustard Seed	-	Quintal	West Bengal	Kolkata	7500	7600	7400
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	7800	7800	5600
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	7850	7750	5600
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	3200	3500	2400
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	4100	4250	3700
Castor Seed	-	Quintal	Telangana	Hyderabad	NT	NT	NT
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	9400	9500	9500
Copra	FAQ	Quintal	Kerala	Alleppey	9150	9350	12100
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	5500	6300	5600

**WHOLESALE PRICES OF CERTAIN AGRICULTURAL COMMODITIES AND ANIMAL HUSBANDRY PRODUCTS AT
SELECTED CENTRES IN INDIA - Contd.**

Commodity	Variety	Unit	State	Centre	Apr-22	Mar-22	Apr-21
Groundnut	-	Quintal	Maharashtra	Mumbai	9900	9500	8600
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2460	2475	1975
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	2430	2475	2475
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	2550	2380	2350
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2800	2750	2800
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2400	2360	1870
Castor Oil	-	15 Kg.	Telangana	Hyderabad	2625	2625	1725
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	2700	2700	2300
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	3350	3350	3600
Coconut Oil	-	15 Kg.	Kerala	Cochin	2220	2265	2678
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	2850	2900	2400
Groundnut Cake	-	Quintal	Telangana	Hyderabad	NT	NT	NT
Cotton/Kapas	NH 44	Quintal	Andhra pradesh	Nandyal	11250	10250	6350
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	9200	9300	6100
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	6500	6500	7975
Jute Raw	W 5	Quintal	West Bengal	Kolkata	6650	6650	8275
Oranges	Big	100 No	Tamil Nadu	Chennai	2000	1800	2500
Oranges	Nagpuri	100 No	West Bengal	Kolkata	900	800	1600
Banana	-	100 No.	NCT of Delhi	Delhi	417	375	417
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	560	580	600
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	85000	74500	87000
Almonds	-	Quintal	Maharashtra	Mumbai	84500	85000	65000
Walnuts	-	Quintal	Maharashtra	Mumbai	95000	93000	68000
Kishmish	-	Quintal	Maharashtra	Mumbai	16200	22500	24000
Peas Green	-	Quintal	Maharashtra	Mumbai	8500	8200	6000
Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	1600	1160	900
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	3000	1500	1500
Potato	Red	Quintal	Bihar	Patna	1140	1080	1100

**WHOLESALE PRICES OF CERTAIN AGRICULTURAL COMMODITIES AND ANIMAL HUSBANDRY PRODUCTS AT
SELECTED CENTRES IN INDIA - Concl'd.**

Commodity	Variety	Unit	State	Centre	Apr-22	Mar-22	Apr-21
Potato	Desi	Quintal	West Bengal	Kolkata	1900	1700	1100
Potato	Sort I	Quintal	Tamil Nadu	Mettupalayam	2722	3200	2922
Onion	Pole	Quintal	Maharashtra	Nashik	750	850	1000
Turmeric	Nadan	Quintal	Kerala	Cochin	11500	11500	12000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	11800	12500	13000
Chillies	-	Quintal	Bihar	Patna	16500	15700	17500
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	49000	47500	35000
Ginger	Dry	Quintal	Kerala	Cochin	17000	17000	20000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	57300	57300	56200
Cardamom	Small	Quintal	West Bengal	Kolkata	122500	135000	160000
Milk	Buffalo	100 Liters	West Bengal	Kolkata	6500	6500	6000
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	59363	58696	59363
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	40000	40000	41500
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	44000	41000	40800
Fish	Rohu	Quintal	NCT of Delhi	Delhi	12000	13000	9500
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	80000	49000	60000
Eggs	Madras	1000 No.	West Bengal	Kolkata	4025	4470	4476
Tea	-	Quintal	Bihar	Patna	27800	27800	25800
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	10235	9884	12963
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	41000	40000	31000
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	22500	22500	22000
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	8600	8750	8500
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	4100	4100	4350
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	13300	13200	13200
Rubber	-	Quintal	Kerala	Kottayam	15600	16200	15000
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	90000	85000	67000

Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.

Crop Production

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING THE MONTH OF MAY, 2022

State (1)	Sowing (2)	Harvesting (3)
Andhra Pradesh	Autumn Rice, Sugarcane, Groundnut.	Summer Rice, Onion.
Assam	Winter Rice, Maize, Tur (R), Cotton.	Summer Potato (Hills).
Bihar	Autumn Rice, Jute, Mesta.	Summer Rice, Wheat, Barley, Gram, Castorseed, Linseed.
Gujarat	Sugarcane, Ginger, Turmeric.	Onion.
Himachal Pradesh	Maize, Ragi, Small Millets (K), Summer Potato (Hills), Sugarcane, Ginger, Chillies (Dry), Tobacco, Sesamum, Cotton, Turmeric.	Wheat, Barley, Gram, Other Rabi Pulses, Linseed, Onion.
Jammu & Kashmir	Autumn Rice, Jowar (K), Maize, Ragi, Small Millets (K), Mung (K), Tur (K), Other Kharif Pulses, Summer Potato, Chillies (Dry), Tobacco, Sannhemp.	Wheat, Barley, Small Millets (R), Tur (K), Sesamum, Rapeseed and Mustard, Linseed, Onion.
Karnataka	Autumn Rice, Jowar (K), Maize, Ragi, Urad (K), Mung (K), Summer Potato (Hills), Tobacco, Castorseed, Sesamum, Cotton, Sweet Potato, Turmeric, Sannhemp, Onion, Tapioca.	Summer Rice, Ragi (R), Winter Potato, Tapioca.
Kerala	Autumn Rice, Ragi, Small Millets (K), Tur(K), Urad (K), Mung (K), Other Kharif Pulses, Ginger, Turmeric, Tapioca (Early).	Summer Rice, Other Rabi Pulses, Tapioca (Late).
Madhya Pradesh	Sugarcane, Ginger, Chillies (Dry), Turmeric.	Winter Potato (Plains), Onion.
Maharashtra	Turmeric.	-
Manipur	Autumn Rice, Groundnut, Castorseed, Cotton.	-

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING THE MONTH OF MAY, 2022

State (1)	Sowing (2)	Harvesting (3)
Orissa	Autumn Rice, Sugarcane, Chillies (Dry), Jute, Turmeric.	Summer Rice, Cotton, Chillies (Dry).
Punjab and Haryana	Autumn rice, Summer Rice, ragi, Small Millets (K), Tur (K), Summer Potato (Hills), Chillies (Dry), Cotton, Sweet Potato.	Wheat, Barley, Winter Potato (Plains), Summer Potato, Tobacco, Onion.
	Wheat, Barley, Rapeseed & Mustard and Linseed.	Jowar, Bajra, Maize, Cotton and Sunn Hemp.
Rajasthan	Sugarcane.	Wheat, Small Millets (R), Tobacco.
Tamil Nadu	Autumn Rice, Bajra, Summer Potato, Sugarcane, Chillies (Dry), Groundnut, turmeric, Sannhemp, Tapioca.	Summer Rice, Jowar (R), Winter Potato (Hills), Sugarcane, Chillies (Dry), Sesamum, Onion.
Tripura	Autumn Rice, Maize, Sugarcane, Ginger, Chillies (Dry), Sesamum, Cotton, Jute, Mesta.	-
Uttar Pradesh	Autumn Rice, Tur (K), Chillies (Dry), Groundnut, Cotton, Jute, Mesta.	Summer Rice, Wheat, Barley, Sugarcane, Tobacco, Rapeseed & Mustard, Sannhemp, Linseed, Onion.
West Bengal	Autumn Rice, Winter Rice, Maize, Tur (K), Ginger, Chillies (Dry), Jute, Mesta.	Summer Rice, Chillies (Dry), Sesamum.
Delhi	Jowar (K), Onion.	-

(K) – Kharif (R) – Rabi

Note to Contributors

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